

# Practical and Amateur Wireless

**3<sup>d</sup>**  
EVERY  
WEDNESDAY

Edited by F.J. CAMM

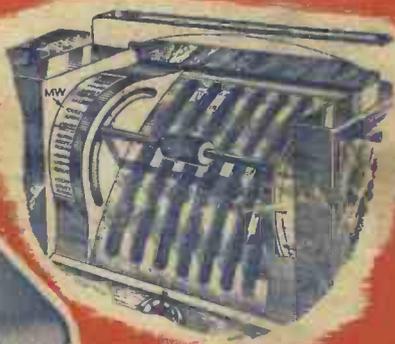
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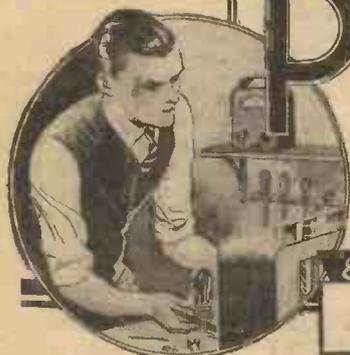
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# How Much L.F. Amplification?—See page 273



# Practical and Amateur Wireless

Edited by **F. J. CAMM**

*Technical Staff:*  
W. J. Delaney, H. J. Barton Chapple, Wh.Sch.,  
B.Sc., A.M.I.E.E., Frank Preston.

Vol. XIV. No. 350. June 3rd, 1939.

## ROUND *the* WORLD of WIRELESS

### Summer Radio

**A**LTHOUGH many listeners cut down their periods of listening during the summer months, there are many who make a practice of taking with them on outdoor excursions portable receivers or radio apparatus which has been adapted for outdoor listening. Portables have changed considerably in design and performance since the idea of a "movable" set was introduced. At first the portables were anything but portable. Apart from their weight they were clumsy and cumbersome and the batteries alone added considerably to the total load. The improvement in valves enabled fewer to be employed with better results and gradually circuit improvements were introduced and weight and size cut down. From large wooden-cabinet constructions the design changed to "suitcase" models and has progressed to-day to extremely compact dimensions. The latest portables have been built round new valves which do not need an accumulator for heating the filaments, and a single small battery provides both H.T. and L.T. In this issue we give some of the more interesting data relating to a number of modern portables which will give a very good indication of the lines which are now being followed.

### More Uses for Radio

**R**ADIO, in the form of a remote-control device, has now been adapted for the testing of motor-cars. Recently at the Morris Works it was found desirable to test a new form of body construction. For this purpose two cars were taken, one with an old body and one with the new type body. The cars were started up and by means of a built-in radio control device were driven at speed and caused to crash practically head-on. The effects of the crash on the different bodies were then photographed.

### Summer Variety Plans

**F**IFTY-SIX different concert parties, broadcasting within a period of eight weeks, form the main feature of the B.B.C.'s plans for summer variety broadcasts.

John Watt, Variety Director, and Chief Producer Harry S. Pepper, began organising the series months ago, in the dull drab days of winter. And, although there remains a considerable amount of detailed work to be done, concert party organisations, whose performances will provide one of the

principal attractions at seaside resorts all over the country, have enthusiastically approved the general scheme.

### Audiometer Tests

**T**HE B.B.C. are now using the audiometer in gauging the audience response in the new "I Want to Be An Actor" series. This device records the amplitude of applause and is switched on for 15 seconds at the conclusion of each turn, an accurate record thus being obtained, and the choice of the audience being correctly interpreted.

### Entertainment Tour of Blackpool

**T**HE first big Blackpool "outside broadcast" of the summer season will take place on June 9th, when the programme will consist of one of those very popular entertainment tours of places of amusement at this famous Lancashire resort. Horace Finch will be heard at the organ of the Empress Ballroom; Ernest Binns' show, "The Arcadian Follies," with Harry Korris heading the cast, will be visited by microphone for a short time; some of the variety acts from the Palace Theatre are to be heard. From the Central Pier, Tom Vernon's "Royal Follies" will broadcast, and an excerpt from the cabaret at the Pleasure Beach Casino will also be included. Victor Smythe is arranging the programme, which will have a special presentation in lyrical form by Frank A. Terry. John Woods Smith will be the entertainer-compère for this programme which is likely to maintain the entertainment standard of the many previous "tours" which Blackpool and the North Region have provided.

### "The Frogs and the Ox"

**"THE FROGS AND THE OX"** is the fable which the North Region will contribute to "Roundabout" on June 7th. Produced by Martyn C. Webster, it will be the sixth in the "Æsop Retold" series which Henry Reed, who is responsible for both dialogue and music, writes in the "Silly Symphony" manner. These fables programmes are very freely based on Æsop stories, and they have amusingly characterised animal and bird voices.

### Cricket Commentaries

**C**OMMENTARIES during the second day's play of the Glamorgan v. Nottinghamshire and Yorkshire v. Hampshire matches will be given on June 5th by E. W. Swanton from St. Helen's Ground, Swansea, and P. G. H. Fender from the Bramall Lane Ground, Sheffield. Commentaries on the third day's play will be given on June 6th.

### Verdi's "Otello"

**T**HE rôle of Otello will be sung by Lauritz Melchior, Desdemona by Maria Caniglia, Iago by Mario Basiola, and the London Philharmonic Orchestra will be conducted by Vittorio Gui, when Verdi's "Otello" is broadcast from Covent Garden on June 7th.

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### Finding an Ancestor

**P**ETER WATTS, a writer new to radio, has written an entertaining programme entitled "Finding an Ancestor," to be broadcast on June 17th, describing two young people's search for an ancestor in order to prove their right to a fortune. He takes them first to Somerset House, then to a country churchyard, then to the Probate Registry, the reading room of the British Museum, and finally to the Public Record Office. In each place they ask a variety of questions and they, and listeners with them, pick up a great deal of interesting information. This is a feature programme treated in a new manner, cleverly combining fact and fancy. The producer will be Stephen Potter.

# ROUND the WORLD of WIRELESS (Continued)

## Ultra-low Power

A NOTABLE achievement by a Danish short-wave amateur, OZ-DR479, has just been reported. He has constructed a portable 1.2 watt, 112 mc/s transmitter-receiver from which R6-S9 reports have been obtained over a distance of nearly 20 miles.

## Radio Progress in Greenland

RADIO-COMMUNICATION facilities in Greenland have advanced considerably during the past year, and the country

## INTERESTING and TOPICAL NEWS and NOTES

borough, who is well known as a J.P. and as a producer in Northamptonshire, will give some character studies; Dorothy Parsons, of Coventry, will entertain as a siffleuse; Fred Adcock, one of Jack Wilson's Versatile Five, is to bring his Rhythmic Violin; and Jim Collier, the

## Music by Eric Coates

ERIC COATES will conduct the B.B.C. Orchestra on June 9th in a programme of his own works, including the first performance of a concert waltz, "Footlights." A selection of his songs will be sung by Garda Hall (soprano)

## Melville Gideon's Melodies

THE third of the series reviving popular tunes by Melville Gideon, in which the melodies are played and sung by Harry Evans, will be broadcast in the Western programme on June 5th.

## R.A.F. Life at Catterick Camp

AN unusual but topical "actuality" feature will be broadcast in the Northern programme from North Yorkshire's great military headquarters, Catterick Camp, on June 7th, when Victor Smythe is to present a programme about the life of Royal Air Force men. The broadcast will be made from records secured at Catterick, and will provide a picture of the work and play of the Junior Service's young men—of the mechanics and riggers, no doubt, as well as the pilots.

## Music from the Seaside

A SIGN of the arrival of the summer season is the frequent appearance in Northern radio programmes of popular orchestral concerts from seaside piers and entertainment halls and from inland resorts. Broadcasts of this type will be given on June 5th, when Jan Hurst and his Blackpool North Pier Orchestra will broadcast in the Regional and later in the Northern programme, and when the Municipal Orchestra, conducted by Louis Cohen and led by H. S. Cropper, will be heard playing from Harrogate's Valley Gardens. Northern listeners on June 6th will also be able to listen to the orchestra at Scarborough Spa, conducted by Kneale Kelly.



When President Roosevelt formally opened the New York World's Fair recently, the National Broadcasting Company used television for the first time for flashing the scene to the homes of Americans. In this inaugural programme from Flushing, Long Island, the N.B.C. camera was focused on the President (A) from a point (B) about fifty feet distant. Thousands of New Yorkers more than eight miles away saw and heard the historic telecast in department store demonstrations or in the quiet of their own homes.

now possesses 23 radio stations which handled 17,000 messages last year. The first four native operators have just qualified for their licences, and four other Eskimos are taking a radio course which was opened by the Danish Colonial Office early this year.

## Worth its Weight in Gold!

JERRY BURNS, WLW-WSAI special events announcer, refuses to join in the general praise of pets. "My Cocker spaniel," he said, "is the dumbest creature that ever lived. He eats too much and sleeps too much, he weighs too much and keeps me awake too much—and I'll sell him for five million bucks!"

## The Thin Red Line

NUMBER nine of the series entitled "The Thin Red Line," will be broadcast in the Regional programme on June 4th, when listeners will hear the history of the Gloucestershire Regiment. Rich though their history is—a glance at their Battle Honours will verify its richness—the programme to be broadcast will deal principally with their history during the Great War, when they fought in France, Italy, Greece, Gallipoli and Mesopotamia.

## Studio Variety

FOUR artists will broadcast in a variety programme from a Birmingham studio on June 7th. Courtney Hope, of Welling-

Singing Lumberjack, will sing of the Western States, where he spent several years.

## WLW Producer's Trip Around World

EVIDENCE that extensive travel can be accomplished on an average budget will be sought by Charles Lammers, veteran WLW (Cincinnati) producer, during the course of a world-wide tour to gather material for a novel radio programme. The producer left recently on a trip to last five months.

He sailed from the West Coast on May 19th on the s.s. *President Taft*, stopping first at Honolulu. Successive countries on his itinerary include Japan, China, the Philippines, Straits Settlements, Ceylon, India, Egypt and the Holy Land, Italy, France, Switzerland, Germany, Holland, Belgium, Ireland and England. The trip is believed to be the longest of its kind for the purpose of gathering broadcast data. Lammers will keep a detailed diary, amplified by picture-taking.

## Dance Music from Buxton

BUXTON, Derbyshire's famous spa, will be on the air early on Wednesday evening, May 31st, in the North Regional programme, with a half-hour broadcast by the Lyrians Dance Band from the Palace Hotel, Buxton.

# SOLVE THIS!

## PROBLEM No. 350

Bentley had a small four-valve A.C. mains self-contained receiver in which the quality was not all that he desired. He decided that by converting the pentode output stage to push-pull he would improve quality, and accordingly he bought another similar pentode valve, converted the transformer secondary to push-pull working by the old dodge of placing two resistances across it, and used the push-pull connections already provided on his loud-speaker. He found, however, that results were no better—if even as good—as with the original arrangement. Why was this? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelope must be marked Problem No. 350 in the top left-hand corner, and must be posted to reach this office not later than the first post on Monday, June 5th, 1939.

## Solution to Problem No. 349

Instability was the cause of Burrows' trouble, and when the choke was screened this reduced the instability, but owing to the decrease in the inductance of the choke caused by the screen the H.F. stage was not working efficiently. The instability, of course, acted in a similar manner to reaction and boosted signals.

The following three readers successfully solved Problem No. 348, and books have accordingly been forwarded to them: J. A. McKinney, 28, Killermont Road, Bearsden, Dumbarton; V. G. Faulkner, 18, Hogshill Lane, Colham, Surrey; M. McEwen, "Sunnyside," 35, Park Lane, Norwich.

# TESTING BY SHORT-CIRCUIT

## A Simple Explanation of a Method of Isolating and Tracking Down a Faulty Component by Systematic Short-circuiting of Different Sections of the Complete Circuit

If you have not previously given thought to the question, you will probably be surprised to find how many faults can be traced and tests carried out by short-circuiting components or sections of the complete circuit. One obvious example is in connection with the on-off switch; absence of contact, causing failure of the set to operate, or dirty contacts which give rise to crackling noises, can easily be checked by connecting a short piece of wire between the two terminals. It is hardly necessary to emphasise that when the receiver is mains-operated the power supply should be turned off at the wall switch before making the test.

The only objection to making tests by the short-circuit method is that, if they are carried out carelessly there is a danger of a component or the power-supply components being damaged. This is mentioned rather as a warning than a deterrent to the use of this simple method of testing, however.

### Tracing the Cause of Noises

When a receiver is "noisy"—that is, when "hissing" or "crackling" background noises are troublesome—it is often fairly easy to find which component is at fault by short-circuiting parts of the circuit in turn. Thus, in dealing with a simple three-valve H.F. receiver with a circuit similar to that shown diagrammatically in Fig. 1, the last valve and speaker could be checked by short-circuiting the secondary of the L.F. transformer by connecting a lead between the points marked a, a. Should the noises cease after this has been done it will be fairly certain that the fault is in a component on the H.F. side of the set; to the left of the points a, a, in the circuit diagram. If the noise is unchanged the output valve and speaker would come under suspicion, and the speaker could be tested very roughly by connecting two leads from it to a 4½-volt dry battery. An intermittent connection within the speaker or its transformer would probably be indicated by a "fizzing" sound. Should the speaker be O.K., the valve would be suspect. There is also the possibility of a fault in the H.T. or L.T. circuit, but that would in all probability be suggested by a diminution in noise level after shorting the transformer secondary.

### Working Backward

Were it found that this test did not yield any useful result, the primary winding of the transformer—points b, b—should be shorted, as a test for the transformer and other components in the detector anode circuit. A further test could be made by short-circuiting the H.F. choke and decoupling resistor in turn. Before shorting this resistor in a mains set it should be ascertained that an excessive H.T. voltage will not be applied to the detector valve.

Should it have been found that there is no appreciable difference in noise level after making the tests so far described it would next be logical to short-circuit the grid tuning circuit of the detector, by joining together the two points marked c, c in Fig. 1. This would still leave the aerial-earth and H.F. circuits out of action, but if the noise

were heard (and assuming it were not heard when b, b were shorted), it would suggest a probable fault in the grid condenser, grid leak, valve or connections to

*by The Experimenters*

one of these. Tests would, therefore, be confined to this section of the circuit, all wiring being examined and new parts temporarily substituted if possible.

### The H.F. Circuit

If the noise had been inaudible during all three short-circuit tests already mentioned, the next step would be to short-circuit the input tuning circuit between the points marked d, d in Fig. 1. Recurrence of the noise would then indicate a fault in the H.F. valve, or the components in series with its electrodes. Disconnection of the screening grid from the fixed potentiometer and connecting it directly to a tapping on the H.T. supply would temporarily eliminate the two resistors, and a test of the H.F. choke in the anode circuit could be made by bridging its terminals. To test the

the efficiency of the coupling in the input coil by transferring the aerial lead, with series condenser in circuit, to the top of the grid winding.

The complete H.F. stage can be virtually cut out by connecting the lead to the anode terminal of the H.F. pentode; thus, if the receiver works better, or not less satisfactorily, with the H.F. stage eliminated it can be fairly certain that there is a defect in one or more of the components in it. As a further check it might be useful to take the aerial connection to the top end of the coupling winding of the inter-valve H.F. transformer, or even to the grid terminal of the detector valve. Incidentally, it should not be forgotten that low signal strength might be due to a fault in the aerial-series condenser which can be tested by short-circuit. This is not advised, however, in the case of a D.C. set where the positive main is earthed.

### Superhet Tests

When dealing with a superhet many of the tests described can be applied, but there are a few additional points to watch. For example, you cannot very well transfer the aerial lead to the grid of an I.F. valve or

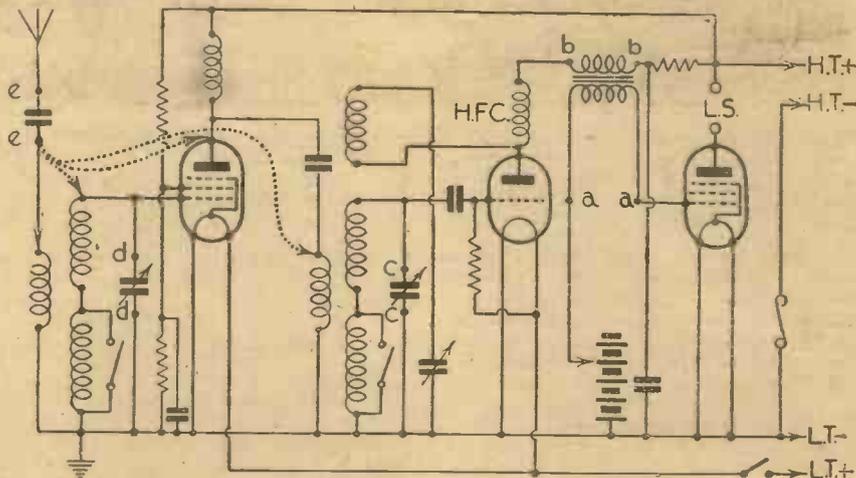


Fig. 1.—Some of the points at which short-circuit tests can be made in a simple H.F.—Det.—L.F. circuit are shown here, and are indicated by letter references.

valve, it would probably be most convenient to fit another one for comparison.

The above very brief explanation of short-circuit tests does not include by any means all of the tests that would be required with many receivers, but does show the correct procedure so that readers will easily be able to devise their own additional tests to meet particular cases.

### Eliminating H.F. Stages

Another method of testing by short-circuit (or at least by a method which is analogous to it), is by transferring the aerial lead to different parts of the set. This method is of chief application when signal strength is poor or when there is H.F. instability. The general procedure is suggested in Fig. 1 by broken lines. Thus, it will be seen that a check can be made on

to the anode of the frequency-changer, because that would leave the input circuit untuned—or at any rate tuned only to the intermediate frequency.

A simple method which can sometimes be adopted conveniently is shown in Fig. 2. The lead to the grid of the frequency-changer is broken, as also is that to the second detector, and a new lead is taken from the top end of the input tuning circuit to the grid circuit of the second detector. By the way, care should be taken in breaking any grid circuit to ensure that the valve is not then under-biased so that the anode current passed is excessive. This can be avoided by short-circuiting the grid circuit, connecting the grid directly to the earth line or point from which the bias potential is obtained.

(Continued overleaf)

**TESTING BY SHORT-CIRCUIT**

*(Continued from previous page)*

The method illustrated in Fig. 2 eliminates both frequency-changer and I.F. stages, and does not, therefore, narrow down the field, in which the fault probably lies, to a very great extent. It is, of course, possible to connect the lead from the input tuner to the grid of the I.F. valve, after breaking the original grid lead, but it is then necessary to replace the second I.F. transformer by a tuner or by a choke-capacity coupling circuit, consisting of an H.F. choke and a .0002-mfd. fixed condenser. That is a clumsy method, but one which is applicable when no other is possible. At the same time it would not assist in tracing a fault in the I.F. transformer, which is put out of circuit.

**Checking the I.F. Stage**

Another alternative method that can be used when testing a superhet, when the oscillator section is suspected, or when it is desired to eliminate the I.F. stage, is to short-circuit the oscillator grid circuit and to connect a tuning circuit or a choke-capacity filter in the anode circuit of the H.F. pentode section of the frequency-changer and to take a lead from this to the grid circuit of the second detector (after having broken the original grid lead). The effect of this is to convert the receiver to a "straight" one with H.F., Det., and L.F. stages. The method is easily applicable only to receivers having a triode second-detector, and cannot well be employed if a double-diode-triode valve is used in this position. In fact, many of the tests described in this article would be totally inadequate for other than a receiver of the simplest type. Nevertheless, it will be found that by making slight modifications

to the methods outlined, similar tests can be applied to many sections of almost any receiver circuit.

**Caution**

It should be stressed once again, however, that short-circuit tests should always be carried out with care, and made only after it has been seen exactly what components are being bridged. For this reason it is a good plan to compare the points in the set with the representations on a circuit diagram.

When short-circuiting H.F. components it is worth bearing in mind that a .1-mfd. condenser is generally just as effective a bridge as is a length of copper wire. Thus a tuning circuit would be effectively short-circuited if a fixed condenser of the value mentioned were connected between its two outside terminals. Similarly, instead of transferring the aerial lead from its normal terminal to the anode terminal of the H.F. valve, the same result could be obtained by joining a fixed condenser between the grid and anode terminals of the valve.

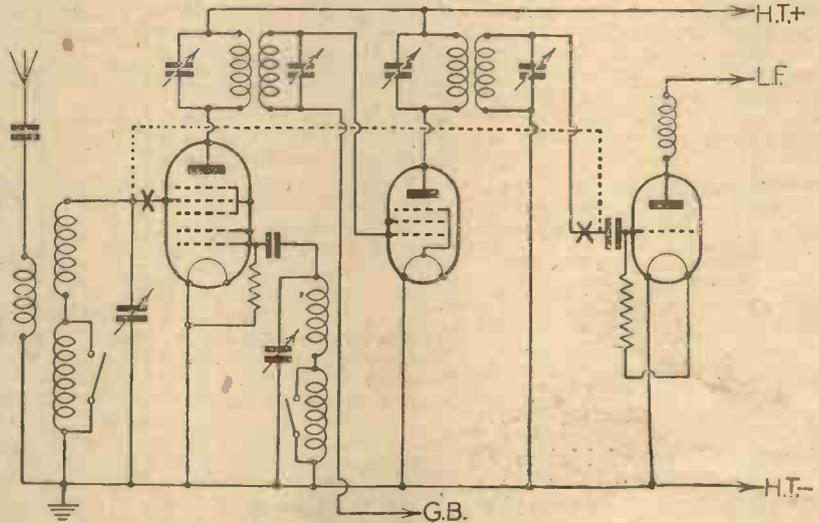


Fig. 2.—The method of using a simple superhet as an H.F.—Det. circuit for test purposes, is shown by a broken line in this skeleton circuit diagram.

**NEWS FROM THE TRADE**

**Philips' Change of Address**

AS from Monday, May 22nd, the address of Messrs. Philips was changed from Charing Cross Road to a new eight-storey building at the end of Shaftesbury Avenue, the postal address now being Philips Lamps, Ltd., Century House, Shaftesbury Avenue, W.C.2. The telephone number—Gerrard 7777—remains unchanged.

**"All-Dry" Exide Batteries**

THE introduction of special portables using valves operating with dry battery L.T. supplies has led to a demand for special batteries combining H.T. and L.T. supplies, and in the Drydex range the following new models are now available:

Cat. No.	List Price	Hgt.	Wdth.	Lgth.	Description
1480	2/6	5 1/2"	2 1/4"	2 1/8"	Socket base 2-pin 1.5v. L.T.
1481	3/9	5 1/2"	4 1/8"	2 1/8"	Socket base 2-pin 45v. H.T.
1482	10/-	2 1/2"	5 3/8"	11 1/8"	Socket base 4-pin 90v. H.T. and 1.5v. L.T.
1483	2/6	4"	2 1/8"	2 1/8"	2-pin standard socket 1.5v. L.T. American No. 742.
1484	3/9	5 1/8"	4 1/8"	2 1/8"	2-pin American socket 45v. H.T. American No. 732.
1158	2/6	2 1/8"	2 1/8"	4"	2-pin socket base.
1159	3/9	4 1/8"	2 1/8"	5 3/8"	2-pin socket base.

**Rotary Converters**

ELECTRO DYNAMIC CONSTRUCTION COMPANY, of St. Mary Cray, Kent, have produced a new leaflet describing rotary converters and similar apparatus for Radio. The "Popular Instrument Guide" occupying three pages, has been



Marconiphone model 883, a recently introduced 5-valve, 3-waveband push-button receiver. Full details were given in our issue dated April 29th last.

brought up to date and a section relating to petrol alternator sets has been modified. Copies of the leaflet are obtainable on application to the firm at the above address.

**Rider Chanalyst**

SERVICE engineers who are in search of a really reliable, foolproof and simple piece of servicing apparatus, should write to Messrs. Holiday and Hemmerdinger, Ltd., of 74-78, Hardman Street, Deansgate, Manchester, for a copy of the leaflet, describing the Rider Chanalyst. This is a modern service instrument with which it is possible to explore every portion of a circuit in a receiver by means of five separate channels. It includes an RF-IF channel; oscillator channel; L.F. channel; wattage indicator; electronic voltmeter; and self-contained power supply.

**Mastering the Morse Code**

IN connection with the article on this subject which was given in our issue dated May 20th last, we should like to take this opportunity of pointing out that some useful Morse keys and associated apparatus may be obtained from Electradix Radios, of 218, Upper Thames Street, E.C.4. Buzzers from 9d. upwards; keys from 3s. 6d., or complete Practice Outfits at 4s. 6d. or 12s. 6d., are some of these lines. Side swing bug keys may be obtained for those who prefer this type at 70s., and there are also some high-class special police keys beautifully made, at 42s. each. For practice on the lines indicated in the article there are some tape Morse recorders for radio to 30 w.p.m., and of these Messrs. Electradix have a number which are partly incomplete, at reasonable prices. Paper tape reels are available, at 6d., and special perforators may also be obtained.

# Modern Aerials and H.F. Coupling

(Concluded from page 250, May 27th issue)

TWO further examples of high-frequency coaxial cabling are given in Fig. 7, showing the different commercial methods for obtaining low attenuation, and at (a) it will be seen that the conductors are centred in narrow longitudinal fins, which, in turn, are set in "Telconax" tubing, which provides protection mechanically, and also from the hygroscopic aspect.

The twin-feeder type cable shown is critically balanced, and the insulation properties assure absolute protection against deterioration influences of gaseous and moist atmospheres.

### Steel Tape Armouring

For conditions where flexibility is not an essential consideration, but where protection against deterioration from external influences is of primary importance, the finish is armoured by steel tape, whilst for more ordinary uses such as television installation, etc., a very flexible cable of the same basic characteristics is available.

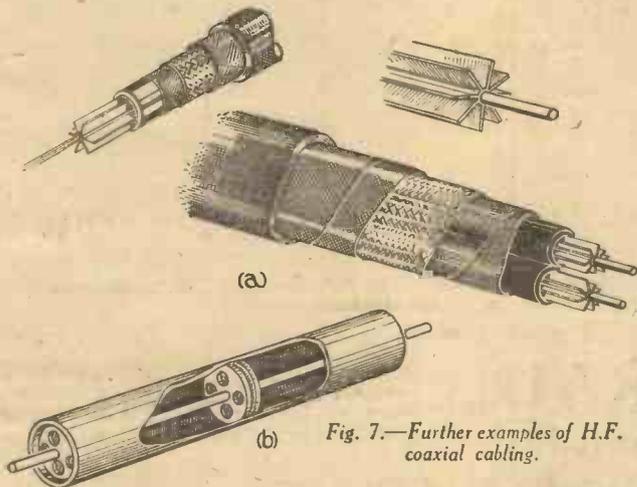


Fig. 7.—Further examples of H.F. coaxial cabling.

The air-spaced disc conductor type, illustrated in Fig. 7 (b) is an interesting comparison, and a product of the same company: the Telegraph Construction and Maintenance Co.

The centre conductor is centred in this case by what are known as "Polystyrol" discs. This is a synthetic substance possessing very good electrical characteristics for high-frequency work.

and the graph in Fig. 8 shows three types of cabling, "A, B and C."

It will be clear from the curves that the air-spaced type "C" has a much more constant performance with very low attenuation, whilst the solid dielectric type "A," although within very good limits for this class of cable, shows a steady increase in

attenuation as the signal frequency increases.

The curve "B" is included to show the gradual straightening out of the curve as the dielectric constant is improved. This curve is characteristic of the semi air-space type coaxial cable.

In conclusion, there is one particularly interesting aerial installation which illustrates the modern trend of design to obtain the greatest efficiency consistent with mechanical stability, ease of erection, and control.

### Fractional-wave Conductor

The type illustrated in Fig. 9 is of the

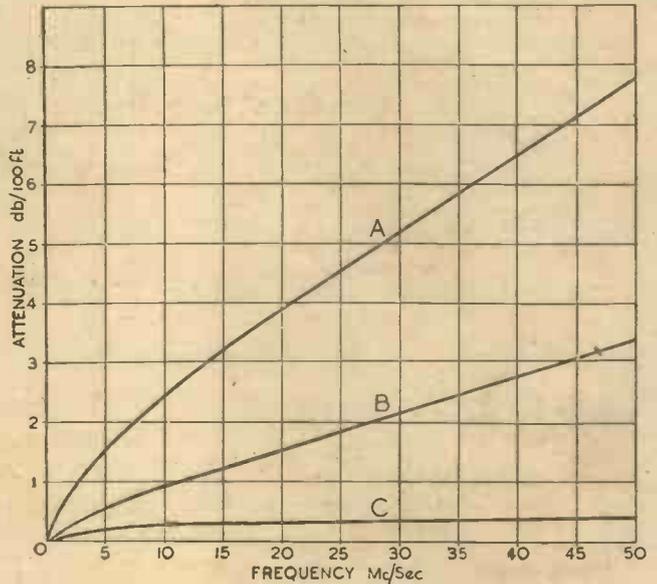


Fig. 8.—A graph indicating the performance of three types of cabling.

The attenuation of such cables at certain frequencies is determined on a comparative basis over a given length,

uni-directional class, and it will be seen that six fractional-wave conductors of the telescopic type are used, mounted horizontally on a framework of wood.

The assembly, as shown with the quoted conductor lengths, is for 10-metre work, and can be made up from kits of parts supplied by "Premax," whilst if desired for a different form of installation, the required parts only may be obtained individually.

The wooden framework is of unique design, and for durability a careful choice of the type of wood which will weather considerable temperature variations and climatic conditions was made by the manufacturers during the preparatory stages in the design.

The telescopic corulite conductors can be obtained double ended, the limits of each end extension providing a maximum length of 17½ ft.; this double-ended type is depicted in the inset diagram (a) Fig. 9.

Reverting to Fig. 2, it will be seen how two of the single type corulite tubes may be used for a simple vertical reflector system.

On referring to the specification of the system illustrated in Fig. 9, it is interesting to note that with one such scheme used for reception in America recently, it was found possible to separate three stations working on the same frequencies with practically the same intensity, the only adjustment necessary in this instance being the rotation of the framework.

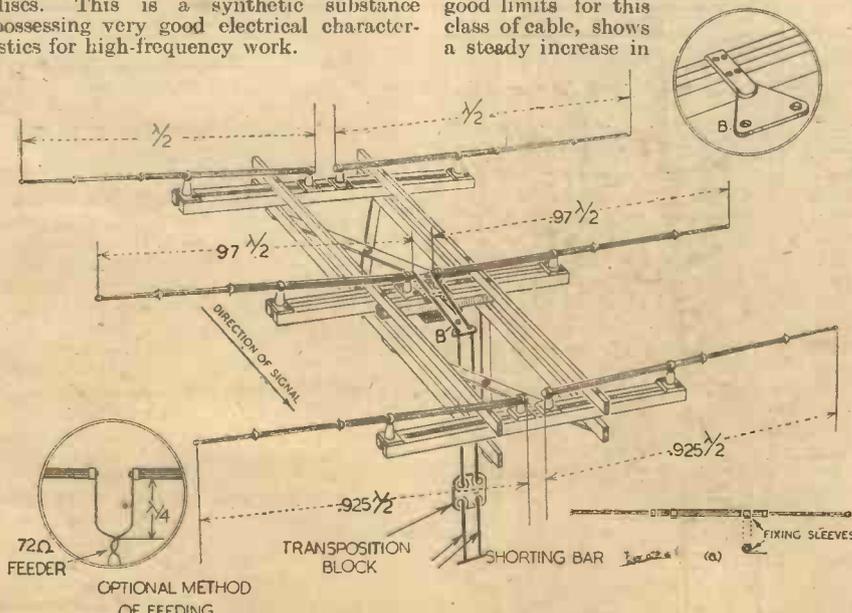


Fig. 9.—A fractional-wave uni-directional aerial system, utilising telescopic conductors.

### PATENTS AND TRADE MARKS

Any of our readers requiring information and advice respecting Patents, Trade Marks or Designs, should apply to Messrs. Rayner and Co., Patent Agents, of Bank Chambers, 29, Southampton Buildings, London, W.C.2, who will give free advice to readers mentioning this paper.



# ON YOUR WAVELENGTH



## Television and the Theatre

THE P.M.G. recently received a deputation headed by Mr. Walter Payne, to represent the effect of the development of television on the living theatre. The deputation, which included representatives of managers, artists, musicians and theatrical employees in the various branches of the entertainment industry, made representations as to the detrimental effects which they claimed that television would have on entertainment given by the performer in person. They placed before the P.M.G. certain suggestions, the adoption of which would, in their opinion, ameliorate the conditions and prevent an undue increase in unemployment in the theatre.

The P.M.G. promised to give full consideration to the views expressed by the deputation and to bring them to the notice of the Television Advisory Committee. Later he received a deputation from cinema interests concerning the development of television in relation to the cinema. He promised that all aspects of the question would be considered by the Committee, and he would not lose sight of their representations.

I now ask the Postmaster-General to give due consideration to my views. They are these. For nearly five years television has been throttled by one interest and another, and it will not be tolerated that older interests shall continue to hamper the new science. I would remind the P.M.G. that conditions to-day would be impossible if the Government had listened to representations made by the stage-coach interests, and as a result had suppressed the railways. We should not have had motor-cars if the horse-drawn vehicle had been granted a monopoly in perpetuity. There comes a time in all industries when the old must give way to the new. That time, as far as the theatre is concerned, is now. The theatre has developed from the open-air performances of Shakespeare's time. The theatre has progressed to a point where it is becoming obsolescent. It is now inconvenient for busy people to have to travel to a theatre, park cars, and scramble for buses and trains in order to see a show.

By *Thermion*

This is the era of mass-produced entertainment when a central bureau, as with sound broadcasting, can bring the entertainment into every home. The P.M.G. will be well advised therefore, to give due consideration also to the needs of the public as distinct from the needs of the few.

The deputation from the cinema industry included representatives from the Cinematograph Cinemas Association, and the Kinematograph Renters Society, and at the conclusion of this discussion the deputation undertook to submit a re-statement of their considered views.

The theatres should not be unmindful of the fact that a lot of money has been spent in developing television, and no-one has yet made any money out of it. I warn them that if they oppose television they will add to their burdens, for the simple fact is that you cannot hold back scientific developments; nor do I believe that television will compete with the theatre. When broadcasting commenced it was thought that it would kill the sale of gramophone records, and that it would prevent people from going to the theatres. We know that has not happened.

### How to Run a Wireless Club

A LIST of the clubs has been published in this journal on many occasions. As this movement is growing, it is necessary to state that unless new societies are run on sound lines, they will not only compete with existing clubs, but will be short-lived. A society cannot exist for very long unless its organisation is planned on a sound basis and the finance is placed on a sure footing. If there is a club in the district, I do not advise the formation of another. Presuming, however, that there is

not a club in your district, and that you desire to form one, the first thing to do is to write a letter to this journal, and to the Editor of your local paper, inviting the publication of a notice asking local readers to get into touch with you. The next step is to call a meeting which should not be held at a private house. The local Parish Rooms, or other premises apart from a public house, should be booked. If possible, induce some well-known local man with a knowledge of wireless to take the Chair.

Put the scheme for the club into the form of an agenda before the meeting to avoid waste of time in discussing generalities. The first thing is to get someone to propose that a wireless club be formed, and that the name of the club be . . . . (name of town) wireless club.

Next fix the amount of the annual subscription. These formalities having been arranged, the meeting should appoint a Hon. Secretary, who should immediately begin to take notes of the proceedings with a view to writing the minutes. These consist of a brief statement without comment of the various propositions, with the name of the proposer and seconder, and the result of the voting. Do not think that a record of the accepted motions will suffice. At some future date you may want to refer to a proposal which was defeated on a vote.

The Chairman will be wise to allow a general discussion. This will give those present an opportunity of showing their ability, and airing their knowledge, and thus guide the meeting when the time comes to elect the officers and committee. This should come next, and it should be followed by a discussion on the rules. It is probably wiser to elect a pro-tem. committee with power to draw up a list of suggested rules, and submit them to a further general meeting.

During the interval it is presumed that those present will talk about the club to their friends, so that the second meeting should secure a larger attendance than the first. Beware lest your club develop into a one-man affair, for this is always possible when the idea of the club arises in the mind

of a single individual who calls a preliminary meeting, has most to say at it, gets himself elected Secretary and proceeds to run the whole show. The main idea of a club is mutual co-operation, and the official duties, like the pleasures and the benefits, should be shared out among as many of the members as possible. Occasionally, disruption occurs when one official of the club, who has done much of the pioneer work, finds that the views of members are against him on some matter of policy.

The President should be some well-known local person with a knowledge of radio. When present, he automatically takes the Chair at meetings; when he is not present the Chair should be taken by the senior Vice-president. A vice-presidency is an honour generally bestowed upon a man who has done good work for the club, or on some prominent local personage who has been, or will be, useful to the club. Vice-presidents pay no fixed subscription, but most of them give a donation.

The Hon. Gen. Secretary is the pivot round which the club revolves. He conducts all club correspondence, keeps minutes of all meetings, produces the report on the past year's working, and presents it to the annual general meeting, incorporating reports from various departmental secretaries. He sends out notices convening committee and general meetings.

The Treasurer collects subscriptions and donations, and gives receipts for them. He produces a rough balance sheet showing the approximate financial position of the club, and a complete and audited balance sheet at the A.G.M. All accounts due for payment are settled by the treasurer, to whom other departmental secretaries refer their items.

The Social Secretary organises dances, concerts, whist-drives and other events of a social nature. It is usual to allow the social secretary a float of a couple of pounds or so to meet his current expenses. He will account for this to the treasurer, and pay to him any profits from social fixtures.

It is important to have a Press Secretary whose duty it is to send reports of the club's activities to the Press. He should make them short and snappy, and each paper should receive a different report. It is useless to include in these reports matters of which all members will be already aware. There should be a news value in them.

At Committee and General Meetings make every effort to start according to the appointed time. The

## Notes from the Test Bench

### Inter-connecting Leads

**WHEN** using a metal chassis it is customary to drill small holes through which inter-connecting leads are passed. In most cases the constructor simply slips a short length of insulated sleeving over the wire and endeavours to make this fast in the hole. The idea is, no doubt, on an economy basis, but there is a risk of the sleeving slipping and a short-circuit resulting. Similarly, where a ragged hole is left and sleeving is used for the full length of the lead, there is also a risk of a short-circuit developing through the sleeving being cut through. A good plan, especially where high voltages are being carried, is to use two or three pieces of sleeving, each of slightly larger diameter, slipping these over one another and wedging them into the hole, a spot of Chatterton's Compound serving to hold them firmly in place. As an alternative sealing wax may be used, but it is liable to chip off.

### Testing Condensers

**A** READER recently asked what he thought to be a most difficult problem. He pointed out that when testing a condenser (without a condenser bridge) it would be impossible to state whether or not the condenser was internally open-circuited, or even whether there was nothing at all inside the case. At first sight it might appear that such a case could be met, but if it is remembered that a good condenser will pass alternating current it will be seen that it is by no means difficult to test such a component. In its simplest form all that is needed is to connect a battery to one side of an ordinary L.F. transformer and to connect the condenser and a pair of 'phones in series across the secondary of the transformer. If the battery circuit is made and broken quickly, the surges on the secondary will give rise to clicks in the 'phones, only if the condenser is intact. A D.C. test will enable one to see if it is short-circuited and thus the "goodness" of the condenser may be ascertained with certainty.

### Using Old Valves

**A** READER recently tried to use an old valve as a half-wave rectifier in a mains set, having, he declared, once read that this could be done. The idea is certainly applicable to good power or L.F. valves, using them as half-wave units (ignoring the grid connection), but an old valve may be lacking in emission and therefore useless for the purpose. The note which he had read probably inferred that unused valves, not old in the sense of decrepit, could be used in the manner indicated.

Chairman must keep order and see that the speakers are not interrupted. No member should be allowed to speak more than once on a proposal, except the proposer, who has a right to reply to the arguments before the motion is voted upon.

The Chairman may accept an amendment to a proposition; this must be proposed and seconded, and, after discussion, put to the meeting and voted upon. Whilst it is an amendment it may not in its turn be subjected to amendment, but if it is carried it must then again be put to the vote as a substantive proposition, and in this form it is subject to amendment. It is presumed that the Chairman will have qualified for his position, and his experience will enable him to guide a meeting without dictating its policy. He must be firm on matters of procedure and not afraid of ruling a speaker out of order if he is infringing the rules of debate. Many clubs have a rule which compels a member to attend a certain number of meetings. Herewith a model set of rules:

1. That the club be called the ..... radio club.
  2. That its annual subscription be ..... payable on ..... Hon. members ..... New members to pay an entrance fee of ..... Members whose subscriptions are not paid by ..... cease to be members.
  3. That the management of the club shall be vested in a committee consisting of the officers, the auditor and six other members, six to form a quorum. Such shall be elected annually at the A.G.M., when the balance sheet, prepared by the Hon. Treasurer and duly audited, shall be presented.
  4. That the committee shall meet once a month or upon receiving four days' notice in writing from the Hon. Sec. Any member of the committee absenting himself from three consecutive meetings without explanation shall be deemed to have resigned.
  5. That in the event of any member acting in a manner detrimental to the club the committee shall have full power to deal with the matter.
  6. Any twelve members shall have the power to call a special general meeting upon written request to the Hon. Sec.
  7. Candidates for membership shall be proposed and seconded by two members of the club.
- Other rules will no doubt be added to suit local conditions.





June 3, 1939

Vol. 4.

No. 154

### A Possible Repercussion

ACCORDING to a well-known film authority in the United States the development of television in that country may have repercussions on the film output. It was suggested, therefore, that instead of the double picture programme in cinemas there was a possibility of the supporting film being replaced by televised entertainment. In any case, however, the exhibitors have been urged not to show any traces of nervousness at the impending wide scale expansion of television, as the industry should be large enough to absorb it. Yet another sign of the times in America is provided by a Bill which has just been introduced in the New York legislature. This proposes that a gross tax of 5 per cent. should be placed on the proceeds of televised sporting events and motion pictures. In introducing the bill it was pointed out that televised pictures of boxing matches, and wrestling bouts, will undoubtedly be commercially sponsored, and the promoters in paying 5 per cent. are not being discriminated against, as they already do that on their film and radio rights.

### Film Television

THE televising of films, although at first thought to be a matter easier of solution than studio scenes, has proved a difficult matter due to inherent defects in the form of electronic apparatus employed. These troubles can be overcome by employing the image-dissector tube where there is an absence of tilt and bend, but the Columbia Broadcasting System of America claim to have perfected yet another form of scanner which on test is said to give good results. Full details of the scheme are not yet available, but as far as can be learned the idea is to run the film through the projector at the continuous rate of 24 frames per second. In so doing the film pictures pass a scanning aperture, and lens system, which operates in conjunction with electronic scanning moving in the opposite direction at the same rate. The combination gives a stationary electronic image which can be scanned at the usual American interlace speed of 60 frames per second, without in any way upsetting the system. Indeed, it is claimed that a more even illumination, and better contrast, materialises from this method. While the theoretical conception of this scanning method is more complicated than the usual form, it is said that the film projector apparatus employed is relatively simple in character, and has no moving optical

sections. A manual controlled compensator permits adjustments to be made to allow for any film shrinkage, and ensures that the optical, and electronic picture frames, are maintained in correct synchronism.

provide domestic entertainment, but there must be a considerable period elapse before this materialises.

### Colour and Definition

ALTHOUGH the intensive research work now being undertaken with all forms of monochromatic television is in no way being relaxed, it is also quite evident that colour television has gone beyond the speculative stage. In every country where television's development is being undertaken on any substantial scale, a certain amount of attention is being directed towards the achievement of good colour television pictures, for just as in the cinema industry it is realised that colour pictures of a high quality are what the public are looking forward to, so with television the ultimate aim must be full natural colour with stereoscopic relief. Only the other day Mr. Baird, who has been a pioneer in this particular field, stated that this aim would eventually be realised, but quite wisely he refrained from attempting to link this up with any forecast of the time that must elapse before that period occurred. It is useful to remember, however, that subjects with less picture detail can be watched in comfort if colour is present, whereas with a black-and-white reproduction this would not be tolerated. Tests have already been undertaken to prove that this is the case, and this is important because of the frequency band involved. In Baird's original colour television experiments he used the three primary colours of red, green and blue; scanning the object to be transmitted with each of these three colours in turn. To give the same number of complete pictures per second, therefore, whether red, green or blue, the speed of transmission should have been increased three times in order to use the single transmission channel. In practice this was found unnecessary owing to many parts being common in the three-coloured television images and doubling the picture speed was found quite satisfactory. The same phenomena prevailed with the big-screen colour demonstrations at the Dominion Theatre, London. Although only of 120-line definition, since the pictures were built up from red and blue/green filters, the resultant picture gave a more pictorial effect to the audience than a black-and-white one of the same line standard. It is certain that even with the frequency band available for to-day's television pictures a changeover to colour television, if such a course were possible, would undoubtedly bring about an improvement in the impression made on viewers with domestic sets. These factors are being borne in mind by present-day investigators and will manifest themselves in a really practical way as soon as technical work on colour television has progressed a stage further.

### Stereoscopic Suggestions

WITH the increasing improvements which are being effected with normal monochromatic television, many suggestions are being put forward in various quarters for televised pictures having stereoscopic effects. With Baird's original experimental scheme he employed a double spiral scanning disc having one set of apertures occupying a semicircle punched nearer to the centre than the second set. Alternate scans then corresponded to the images seen by each eye, separately, and these pictures

### B.B.C. Staff and Television

IN order to acquaint producers of sound programmes with the technique of television production, B.B.C. staff will from time to time be seconded to the Television Department at Alexandra Palace. Accordingly Mr. Val Gielgud, Director of Features and Drama, will be temporarily transferred for six months, as from July 1st next, to the Television service.

During this time Mr. Gielgud will act as a television producer, so obtaining practical studio experience. It is hoped that Mr. Gielgud will be only the first to have the opportunity of studying television production under working conditions.

During Mr. Gielgud's temporary absence, Mr. Moray McLaren, Assistant Director of Features and Drama, will be in charge of that Department.

were reproduced on a geometrically similar scanning disc at the receiving end, the observer undertaking the view through a special optical device. One idea that has now been put forward is to use two cameras as a twin unit at the studio end. These would be made to scan either alternate lines or alternate frames, while employing a single communication channel. At the cathode-ray tube receiver, however, difficulties would be experienced unless an optical viewing device was incorporated. Another suggestion was to use a double camera unit, and two separate signal channels. The pair of carrier waves would be received, simultaneously, and applied to two cathode-ray tube assemblies arranged for stereoscopic viewing, and if necessary, magnified in size to compensate for the smaller pictures reproduced when receiver size has to be kept down to reasonable dimensions. No doubt in time to come pictures in relief will replace the flat ones which now

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

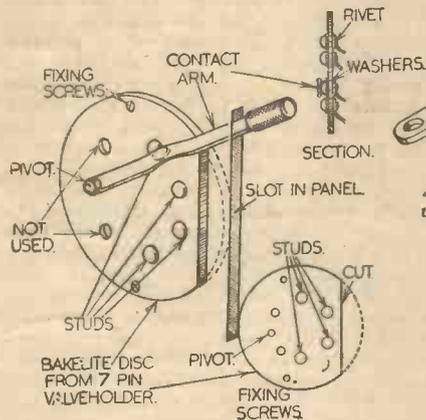
READERS WRINKLES

THE HALF-GUINEA PAGE

A Handy Lever Switch

A DISUSED seven-pin valveholder can be utilised for making a useful switch, as shown in the accompanying sketches.

The top disc is removed and the existing holes used to take four studs. A contact bar is next fastened in one of the holes left by the heater sockets, and with an insulated sleeve attached to the end of the arm a toggle type of switching is obtained. The disc is attached to the inside of the cabinet or to the chassis by using existing fixing screw holes. A slot will, of course, be cut in the front panel long enough to allow the movement necessary for working the switch arm, as illustrated. Several uses can be made of the switch which, while being simple to make, is only  $\frac{3}{8}$  in. in depth and  $1\frac{1}{4}$  in. in diameter.—J. TYRRELLS (Edmonton).



A handy lever switch utilising a disused seven-pin valveholder.

A Remote-control Device

I RECENTLY found it necessary to use a remote control for a battery set, and I made the effective device illustrated herewith. The coil is energised and the strip is withdrawn from the cog wheel, the motor then turning the key which presses on the contacts. This switches on the L.T. In my case the H.T. was separately controlled as it was used with an H.T. eliminator, but the key could be provided with a cross piece to operate two contacts placed side by side, these being placed one slightly in front of the other so that H.T. and L.T. would be switched on separately with the necessary slight delay. There is no stop mechanism, the push-button of the remote control circuit being released when the set is heard to "click" on. Pressure again causes the motor to turn the key and switch off. A good contact surface must be used to avoid loss of current in the L.T. supply.—D. R. STEWART (Newport, Mon.).

A Dual-purpose Combined Tuning and Reaction Drive Assembly

WHEN building a new short-waver recently, I decided to incorporate a rather novel and efficient system of tuning and reaction control using friction drive

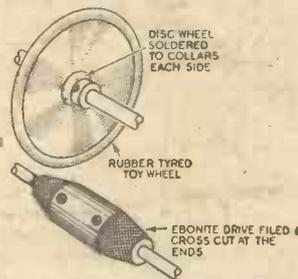
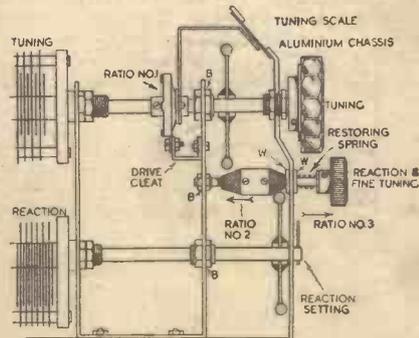
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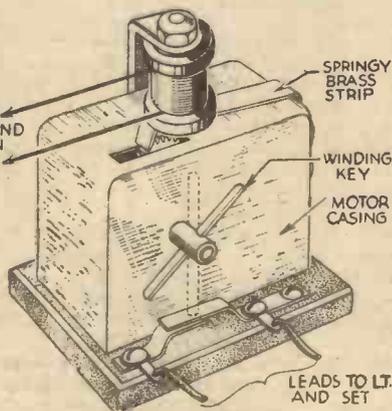
clearly shown in the sketches.—F. D. LENNOX (Sittingbourne).



A combined tuning and reaction drive assembly.

throughout. In the diagrams it will be seen that with the aid of two toy wheels of the rubber-tired type, and a spring-controlled driving member of ebonite, a dual-purpose action is obtained. The normal tuning drive reduction is done through the medium of a 6:1 epicyclic movement (ratio No. 1), and to obtain still finer tuning it is only necessary to press in the reaction and fine-tuning knob which engages the ebonite drive with the rubber-tired wheel, giving ratio No. 2, as indicated in the illustration. To ensure a smooth control at this point, two slip washers "W" are provided, as shown. On removing one's hand from the fine-tuning knob this drive restores to normal, engaging with the reaction wheel under the pressure of the spring, this providing reduction for the reaction control. A back-lash free movement is obtained by using brass shaft bushes "B," whilst the method of fixing the wheels is simple, and will give quite satisfactory stability. The remainder of the assembly detailing is

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It is interesting to recall the time when it was possible to anticipate very closely the performance of a receiver, judging purely by the number of valves, the style of component lay-out and the size of the H.T. battery. This is by no means the case to-day; the improved valves, the considerably reduced dimensions of the component parts used in the present-day chassis, permitting far more involved circuits to be embodied with fewer valves and without appreciably increasing the weight or size of the set.

Whilst the advance made in component technique has resulted in smaller resistances, condensers, tuning inductances, transformers and chokes, the efficiency of their



Fig. 1.—The Roberts portable, in which the complete receiver unit is removable.

characteristics has been very greatly improved. Consequently, component limitation which previously had to be resorted to to keep the weight and proportions of the receiver down, consistent with the efficiency of the circuit, has been almost completely obviated, any sacrifice from this aspect to-day having negligible effect on the function of the circuit whilst in many instances improving the utility of the set.

### H.T. and L.T. Supply

The question of aerial and H.T. and L.T. supply still furnishes plenty of food for thought, although the vast improvements made in battery design again has resulted in the production of small cells having more constant capacity, with obvious ability to handle heavier loads for a greater period of use. This means that the deterioration in performance of a receiver through feed-back trouble which gives rise to instability and calls for considerable decoupling, is reduced to a minimum.

The aerial system in the majority of truly portable designs, where chassis congestion results in the close proximity of certain sections of the receiver to the frame aerial, still necessitates some experiment on the part of the designers to prevent that which was referred to just now—component interaction—but this, by systematic layout and incidental position of the affected parts, seldom proves a serious set back.

# A NEW OUTLOOK

## T.R.F. Circuit

For quality reproduction with a reasonable degree of selectivity, the straight T.R.F. type of circuit lends itself admirably from the point of view of portable design, and this is therefore widely employed, whilst for a greater receptive range with the same degree of quality, and to incorporate refinements such as A.V.C., the superhet type of circuit is essential.

All-wave reception, which has found its way into the portable class, adds to the steadily increasing list of improvements witnessed in the design of these sets, possibly making the portable unique in demonstrating the development of radio technique.

Short-wave reception requires the most critical attention to detail and component efficiency if the best results are to be obtained.

The moving-coil speaker and the improvements made in the output circuits by the introduction of multigrad valves for increased output and greater sensitivity, is another of the considerations which bring the portable up to the standard type in merits of performance.

## Midget M.C. Speakers

In this respect, the perfection of the midget type of moving-coil speaker plays an important part, permitting remarkable results to be obtained from the smallest of receivers, whilst box resonance and the like is counteracted with the result that the larger receivers provide considerable volume with a comparatively low order of H.F. From this aspect emerges the fact that quite a margin of economy exists with regard to the drain on the H.T. battery; thus by carefully distributing the load, it is possible to use a smaller battery with consequent advantage from the point of view of true portability with good quality reproduction and selectivity.

Mains-operated portables really come under the category of the transportable,

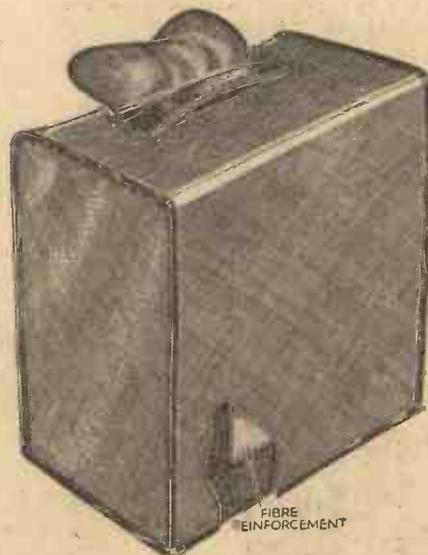


Fig. 3.—For weather protection Roberts Radio provide a waterproof cover.

## A Summary of the Utility and Portable and Transportable

although from the question of size and weight, they very conveniently fit in with the average requirements of portability from the angle of home use.

## For Car Use

There still exists the misconception that a portable receiver cannot possibly be used

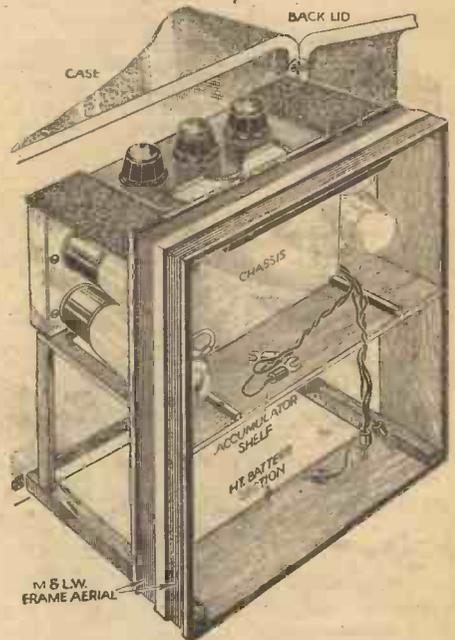


Fig. 2.—This is the "inside" of the Roberts receiver illustrated in Fig. 1.

in a car not fitted with suitable noise suppression equipment, and it may be of assistance here to point out that, in many cases, the degree of interference will be almost negligible with either frame-aerial operated receivers or portables working from an external aerial system, although in the latter instance the susceptibility of ignition radiation through the chassis of the car will be greater. The frame aerial can in noticeable cases be used to advantage directionally, rotating in the desired position possibly reducing sensitivity to the signal being received, and increasing the volume control.

Holidays, A.R.P. requirements, the sick bed, cycling, and other activities find the demands for radio for entertainment or educational value, answered by the wide variety of types of receivers now available, but it is a wise plan for the contemplative purchaser of a set to determine beforehand the conditions of use to which the receiver will be subjected. He or she may then obtain the most suitable type of receiver for the purpose; a portable, which, for example, is being taken on extensive touring, will require to be thoroughly fool-proof, and able to stand up to varying conditions of climate.

# ON PORTABLES

## Capabilities of the Modern Portable Types of Receiver

### Roberts Radio

The receiver manufactured by Roberts Radio, Ltd., and illustrated in Fig. 1, is a particularly good example of a set meeting such requirements, the circuit employed being of the T.R.F. type built along sturdy lines, and providing considerable volume without any irritating effects of cabinet

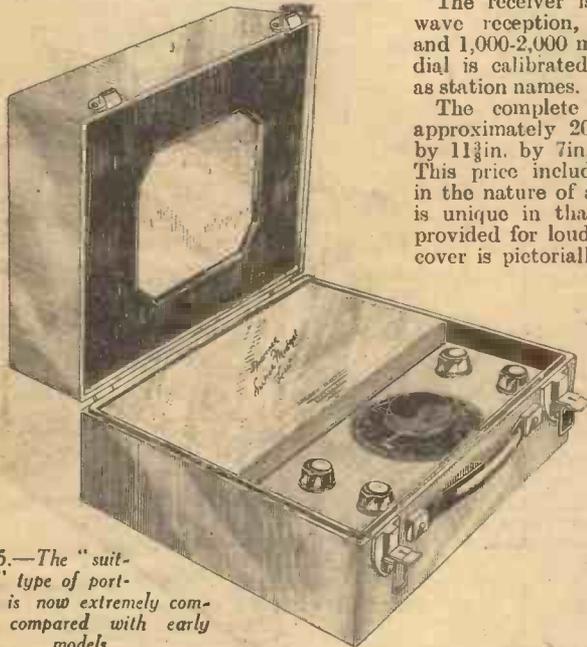


Fig. 5.—The "suitcase" type of portable is now extremely compact compared with early models.

resonance. Four valves are employed, the circuit comprising a high-frequency stage, triode detector, then low-frequency amplifier followed by a quiescent push-pull output stage.

From this alone it will be seen that a really powerful arrangement is provided, capable of efficiently driving the 6in. permanent-magnet moving-coil speaker used from an H.T. battery of only 108 volts.

The writer made a thorough examination of the chassis construction and case detailing, to determine the extent of utility which can be expected from such a design, and as an interesting example of the assembly detailing, and to illustrate the convenience with which the complete chassis and frame aerial can be withdrawn for thorough examination when this may be required after considerable use, the illustration in Fig. 2 is given, depicting the com-

plete "unit" being removed by sliding out of the back of the cabinet. From this illustration it will be seen how conveniently accessible are the H.T. battery (which includes the grid-bias) and the accumulator for replacement and recharging, whilst the diagram shows the clean lines of the chassis design, providing good protection against dust, etc. Both the hinged lid covering the receiver controls and the hinged back of the cabinet are provided with lock clasps, a consideration which falls in well with the requirements mentioned above.

The receiver is for medium and long-wave reception, covering from 200-550 and 1,000-2,000 metres, and the full-vision dial is calibrated in wavelengths as well as station names.

The complete receiver, which weighs approximately 20lb. and measures 11½in. by 11½in. by 7in., is priced at 9 guineas. This price includes a further refinement in the nature of a waterproof cover which is unique in that extra reinforcement is provided for loudspeaker protection; this cover is pictorially illustrated in Fig. 3.

The quality of reproduction claimed by the makers of the receiver (Model M.4.Q.) was evident, whilst there was no falling away as the volume was increased almost to the point of distortion under maximum working conditions, and when tried out under adverse conditions in a steel-framed building, a number of distant stations were reproduced with a pleasing brilliance of tone, the North Regional broadcasts being particularly clear for the locality chosen for the test.

### Push-button Tuning

Push-button tuning provides a particularly desirable feature for the mains operated transportable type of receiver,

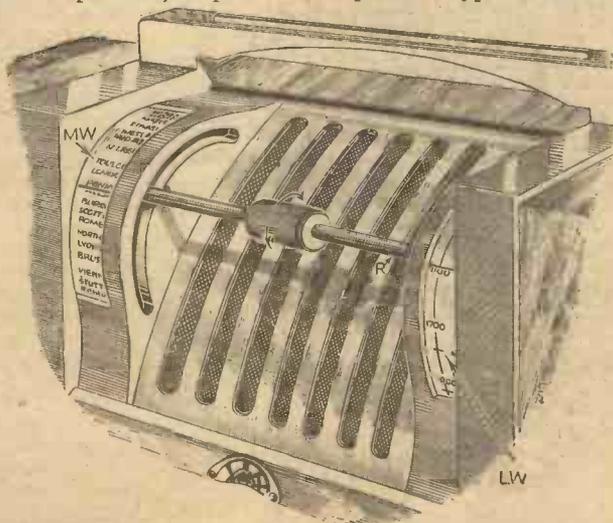


Fig. 6.—An ingenious form of tuning control found on the McMichael portable.

and one such model, the Cameo type "P," manufactured by Gordon Elf, Ltd., is illustrated in Fig. 4.

In this case there is a choice of six stations from the medium and long-wave bands, and it will be noticed that there is no tuning dial, the purpose behind this design being for a completely trouble-free type of set, offering absolute simplicity in tuning.

The sequence of stations can, of course, be adjusted to individual requirements, but once set, it is only necessary to press the button corresponding to the desired station in the usual way, but adjusting volume and tone by separate knobs.



Fig. 4.—A push-button portable produced by Gordon Elf, Ltd.

Embodying a high fidelity superhet circuit driving a 6in. moving-coil speaker, and finished in wax walnut, 9 guineas is a very reasonable price for this class of receiver. The mains voltages for this model are from 200 to 250 A.C. or D.C., whilst the fact that no aerial or earth is required brings this model into the class of self-contained mains-operated portables.

### Midget-Four Superhet

In the nature of a distinct and interesting comparison of receiver types, and made by the same company, is the Midget-Four superhet, incorporating all the refinements usually found in mains-driven models; this type is shown in Fig. 5, and takes the form of a suitcase model. This style has particularly good merits from the portable aspect, and furnishes a neat example of the modern version of one of the earlier designs. From this viewpoint then, it will be interesting to glance through the circuit specification, bearing in mind the points mentioned in the opening paragraphs.

An octode frequency-changer is used in this instance, this being coupled to a variable-Mu screened-grid intermediate frequency amplifier, which is in turn coupled to a combined double-diode-triode valve having the characteristic of providing linear detection, delayed automatic volume control, and L.F. amplification. A Q.P.P. valve follows this sequence, feeding a large permanent-magnet moving-coil speaker.

A large frame aerial housed in the lid provides excellent pick-up and range, and here it will be noticed is one of the advantages to be had from this type of design, since the aerial is in this way absolutely

## A NEW OUTLOOK ON PORTABLES

(Continued from previous page)

isolated from the receiver chassis, thus adapting itself to the suit-case style.

## "Rotabar" Tuning System

The "Bijou" battery and mains portable receivers in the McMichael range, are interesting examples of the efforts of the designers to combine originality with simplicity, the "Rotabar" tuning system employed in these two models being quite unique, and providing "silky" control by a cam-operated movement, the details of which are given in Figs. 6 and 7.

Referring to these illustrations, it will be seen that two separate scales are used, one for the medium-wave band, and the other for the long-wave band, each scale being marked in station names and wavelengths. A cam-operated movement gives a novel form of reduction drive, no gears of any sort being employed, as will be apparent from the pictorial diagram in Fig. 7.

To the ganged condenser shaft, which protrudes through the chassis side, is fitted a short bar, having at one end a short pin "S" which rides on the edge of the cam for only a short distance between the limits of the condenser travel. By glancing at the "Rotabar" shaft "R," it will be seen that the reduced diameter end section "RI" bears on the periphery of the dial-moulding slot, the pressure being maintained along the whole length of travel by a spring-controlled rocker pivoted to the main travelling strip.

As this strip, and the cam strip, are commonly fitted to the main bearing shaft, the movement through the arc of the "Rotabar" causes the condenser operating strip to be drawn upwards under the control of the cam spring, whilst the downward action of the "Rotabar" results in the spindle being pushed downwards, consequently propelling the condenser strip. In each case, however, the spindle on the condenser operating strip bears on the periphery of the cam being governed by the cam spring, riding between the limits shown.

The scale pointer (only the L.W. being shown here, as this section shows the principal drive) is secured to the corner of the "Rotabar" strip, and excepting for the condenser assembly details, the identical action takes place for the medium-wave scale on the left.

## High-fidelity Circuit

A high-fidelity four-valve H.F. circuit is employed in the battery receiver, providing a full-toned reproduction with smooth reaction and very good selectivity, whilst sockets for external loudspeaker, aerial and earth are provided, thus extending the capabilities and utility of this model (No. 387) which is retailed at 8 guineas complete. The weight of this receiver is 22lbs.

The mains version (model 808) embodies a five-valve superhet circuit having 8 stages, the quality being quite in keeping with the usual McMichael standard. This receiver is listed at 10gns. for the walnut-finished type, whilst the leatherette style is only

is the Pilot "Little Maestro" five-valve superhet, listed at 5gns. All valves are of the latest high-efficiency octal type, and the circuit sequence is as follows.

A self-contained "wound line" type aerial is used in place of the more conventional frame aerial, but whilst it is not essential to unwind this aerial for the majority of requirements, the sensitivity will be increased by so doing, should this be desired. The broadcast range is from 200 to 550 on the medium-wave band, the long-wave band covering from 1,000 to 2,000 metres, the full vision dial being calibrated with station names and wavelengths.

A heptode frequency-changer is employed, the first detector being an H.F. pentode. Second detection is carried out by a double-diode-triode providing also the A.V.C. Resistance-capacity coupling is effected between the D.D.T. and the pentode output valve which delivers 2½ watts. Whilst standard chassis are designed for operation on A.C. or D.C. mains 200-240 volts, special models for mains voltages of 100-120 can be supplied, when required, at no extra charge.

The portable models are finished in blue leatherette giving them a quiet but distinctive appearance, and weighing only 8lbs., it will be apparent that a wide variety of purposes can be served by the use of a "Little Maestro," even when the family receiver predominates in the home. In this instance, which typifies the desirability of using more than one receiver, individual wishes

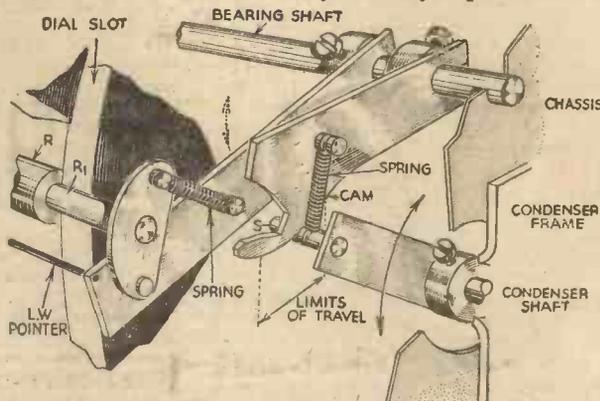


Fig. 7.—The mechanism of the McMichael portable illustrated in Fig. 6.

9½gns., and is for operation from A.C. mains.

## Pilot "Little Maestro"

From the range of universal (AC/DC) portable types, one which has an outstanding performance for a low-priced set

from the listening point of view are better provided for in the use of a portable than in extension-speaker schemes which, considering the cost, do not fall (if at all) much below the cost of the Pilot receiver detailed here, and, of course, the receiver has a much wider field of utility.

## BROADCAST EVENTS OF THE WEEK

**NATIONAL (261.1 m. and 1,500 m.)**  
Wednesday, May 31st.—*Traviata, Acts 1, 3 and 4, from Covent Garden.*

Thursday, June 1st.—*Lucky Dip, nineteenth Edition—a weekly magazine programme.*

Friday, June 2nd.—*Musical Games, a play by Ronald Mackenzie.*

Saturday, June 3rd.—*Hyde Park Five Brigade Display.*

**REGIONAL (342.1 m.)**

Wednesday, May 31st.—*"Roundabout," an all-Regional Variety show.*

Thursday, June 1st.—*Only a Shop Girl: A musical burlesque by the Melluish Brothers, from Midland.*

Friday, June 2nd.—*Olympia: Royal Tournament.*

Saturday, June 3rd.—*The Midland Automobile Club Hill Climb at Shelsley Walsh: a commentary on part of the afternoon's programme.*

**MIDLAND (297.2 m.)**

Wednesday, May 31st.—*Sportsman's Diary.*

Thursday, June 1st.—*Only a Shop Girl: A musical burlesque by the Melluish Brothers.*

Friday, June 2nd.—*Variety from the New Hippodrome, Coventry.*

Saturday, June 3rd.—*The Midland Automobile Club Hill Climb at Shelsley Walsh: a commentary on part of the afternoon's programme.*

**WEST OF ENGLAND (285.7 m.)**

Wednesday, May 31st.—*The Lockier-Grosvenor Octet Instrumental programme.*

Thursday, June 1st.—*A Variety programme from the Pavilion, Bournemouth.*

Friday, June 2nd.—*What sort of Music? A round table discussion about the relative value and interest of dance and classical music.*

Saturday, June 3rd.—*A recital of West Country Songs.*

**WELSH (373.1 m.)**

Wednesday, May 31st.—*Portrait of a Peninsula or A Mirror to Gower, devised by Ethel Ross.*

Thursday, June 1st.—*Ruthin School, another of the older foundations in Wales, a talk.*

Friday, June 2nd.—*Elis Wynne: a feature programme.*

Saturday, June 3rd.—*We Bring a New Song, a musical sequence.*

**NORTHERN (449.1 m.)**

Wednesday, May 31st.—*Elizabethan Madrigals, choral programme.*

Thursday, June 1st.—*They Speak for Themselves: A radio enquiry into "Mass Observation."*

Friday, June 2nd.—*People's Theatre—2: A radio presentation of the history of the Bradford Civic Playhouse.*

Saturday, June 3rd.—*Northwich Air Race Display.*

**SCOTTISH (391.1 m.)**

Wednesday, May 31st.—*Scottish Dance Music, Orchestral programme.*

Thursday, June 1st.—*The Troubles of Hector the Crofter or The Selling of the Stirk by Angus MacDonald.*

Friday, June 2nd.—*Concert Party programme, from the Opera House, Dunfermline.*

Saturday, June 3rd.—*Band programme.*

**NORTHERN IRELAND (301.1 m.)**

Wednesday, May 31st.—*Accent on Rhythm: A selection of dance tunes, old and new.*

Thursday, June 1st.—*Irish Rhythms: Orchestral concert.*

Friday, June 2nd.—*"17th Century Album," a feature programme.*

Saturday, June 3rd.—*Flute Band concert.*

# TELEVIEWS

## A New Television Rule

IN order to regularise a position which was not envisaged when their original licence terms were drafted some years ago, R.C.A. Photophone of America have now given full liberty to their recording licensees to make films for television, or alternatively to use films already recorded for television programmes. No extra charge is being made for this concession, and there is no doubt that this will help to clear the air somewhat in that country in so far as the use of films for television transmissions are concerned. The B.B.C. experience considerable difficulty in securing films for their own programmes, apart from news reels, and in many quarters the feeling has been expressed that a removal of any film ban with, of course, protective reservations in so far as the exhibitor is concerned, would do much to close any gap now existing between the film and television industries. Perhaps when the P.M.G. has received the deputation representing the film exhibiting side and explained the whole position where divergence of opinion exists, the spirit of co-operation will manifest itself once more on an equitable basis.

## Not Fantastic Now

THERE is no doubt that the continued attention which has been given to armaments and methods of defence has caused many people to turn to the science of television as being a possible factor in modern warfare. When television transmission and reception was first mooted as a possibility some ten to eleven years ago many naval and military applications were visualised, but the experimental and crude nature of the equipment then used prevented any serious attention being given to this matter. Modern high-definition apparatus has altered all this, however, and there is no doubt that for certain purposes the principles of television will play their part should the necessity arise. The ability of modern television cameras to penetrate fog and haze has enabled engineers to speculate on how they can be applied to act as "eyes" where normal human vision is impossible. Due to the infra-red sensitiveness of the mosaic signal plate it is no idle theory to suggest that with telescopic lenses, distances up to at least half a mile or even more could be bridged, and the fog obscured scene made visible on receiver screens suitably positioned and fed with signals from the camera. Smoke screens may even be penetrated from the bridges of battleships and surprise infantry attacks under cover of fog prevented, simply because the television apparatus would maintain a constant vigil and portray any untoward activities by watching the receiver screens. These ideas have now progressed beyond the realm of theory and in any case of emergency it is certain that equipment could be perfected rapidly to meet the needs of defence or attack.

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**MODEL 7083A.** 5v. A.C. All-Wave Superhet Chassis. A superlative receiver incorporating modern improvements. Output over 3 watts, air cored bandpass coils. S.M. tuning, illuminated dial, A.V.C. tone control. P.U. sockets. Wave range 18-52, 200-550, 300-2,100 metres. A.C. 200/250v. Chassis dimensions approx. 9ins. H. x 12ins. W. x 9ins. D. Fully tested. **BARGAIN** less valves, 62/6, or with valves, 82/6, 5/- deposit secures, balance in 18 monthly payments of 6/4.

**MODEL 8025.** Console All Wave Battery S.G.3 complete receiver in splendid console cabinet, 31ins. high and fitted with matched permanent magnet M.C. speaker and 3 British valves of guaranteed life. Wave-range 18-52, 200-2,100 metres, less batteries. Ready for use. **BARGAIN** 24/19/6 or 5/- deposit secures, balance in 18 monthly payments of 6/4.

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chassis only. Size approx. 7ins. H. x 12ins. W. by 9ins. D. Fully tested. Less valves. **BARGAIN** 47/6, or complete with 4 matched valves 55/-, or 5/- down and 12 payments of 5/-.

**MODEL 7054.** Super A.C. Mains Bandpass S.G.4 chassis with matched valves, 200-2,100 metres. Chassis size approx. 9ins. H. x 12ins. W. x 9ins. D.

**BARGAIN** 57/6 or 5/- down and 12 monthly payments of 5/3.

**MODEL 7032.** Battery All-Wave S.G.3 in handsome walnut veneered upright table cabinet with moving coil speaker and valves. Less batteries. Wave-range 14-2,100 metres. World-wide reception. Only 10 m.a. H.T. consumption. Station-name dial. Set for those with no mains at their disposal. **BARGAIN** 85/- or 5/- only secures, balance in 18 monthly payments of 5/6.

**MODEL 7032.** Fully tested chassis only. Chassis size approx. 9ins. H. x 12ins. W. x 9ins. D. Less valves. **BARGAIN** 42/-, Complete with valves 69/-, or 5/- down and 15 monthly payments of 5/-.

**MODEL 7034.** Super All-Wave S.G.3 battery receiver. Superb cabinet and a set that will delight all the family. Stations galore with grand tone. Less batteries. Ready to play. **BARGAIN** 24/19/6. 5/- easy payments deposit secures.

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**MODEL 7043.** Battery Bandpass S.G.4 chassis with matched valves. Highly efficient 4-valve model with S.G. and Class "B" output. Amazing range. English and Foreign programmes always available. Wave-range 200-2,100 metres. Quiescent H.T. consumption 8 m.a. Chassis size approx. 7ins. H. x 12ins. W. x 9ins. D. Fully tested. **BARGAIN** 55/-.

**MODEL 7044.** Super Bandpass Class "B" 4 chassis with all valves. Wave-range 200-2,100 metres. Chassis size approx. 9ins. H. x 12ins. W. x 9ins. D. **BARGAIN** 57/6.

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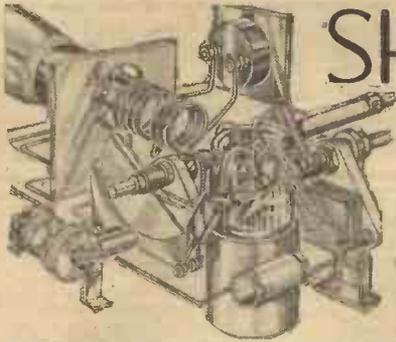
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# SHORT-WAVE SECTION

## BELOW 20 METRES

The "Amateur Bands" and Special Notes on the Design of Short-wave Tuning Circuits

By W. J. DELANEY

MANY amateurs regard all wavelengths below 100 metres or so as "short waves" and fail to obtain the best results from their short-wave receivers on account of the fact that they overlook many of the important features of some of the shorter wavelengths. Much of this misconception arises from the fact that it is still customary to talk in terms of "wavelengths" and accordingly the type of signal, if we can call it such, is overlooked. It must be remembered that a signal from a transmitting aerial radiates in much the same manner as the ripples on a pond after a stone has been thrown in, and the wavelength is actually the distance from the peak of one wave to the peak of the next—or from any similar point on one wave to a similar point on the following. It is therefore obvious that the shorter the wavelength the greater will be the speed of the waves, or in other words the number of waves in a second. This time factor is the frequency of the signal and you can see, therefore, that as the wavelengths become shorter the frequency increases. It is not an easy matter to explain the behaviour of oscillating currents for beginners, but it is not difficult to see that when the waves are travelling at higher speed they are more difficult to control and therefore it becomes increasingly important to ensure that the signal currents go where we want them. They will take the easiest path to earth, and this is the reason for the need of introducing high-

are generally referred to as the Amateur bands. There are five of these, commonly referred to as the 1.7, 7, 14, 28 and 56 megacycle bands. They are also known as the 1,700, 7,000, 14,000, 28,000 and 56,000 kilocycle bands. The term megacycles is becoming more popular and it is a simple matter to remember that 1 megacycle is 1,000 kilocycles. A definite

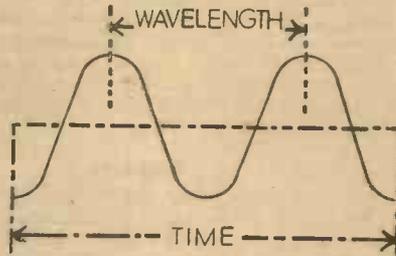


Fig. 1.—The form of a radiated signal showing relation between wavelength and frequency (time).

band of frequencies is used for each of these Amateur transmitting ranges and these are as follow:

- 1.7 mc/s band—1,720 to 1,995 kc/s.
- 7 mc/s band—7,005 to 7,295 kc/s.
- 14 mc/s band—14,005 to 14,395 kc/s.
- 28 mc/s band—28,010 to 29,990 kc/s.
- 56 mc/s band—56,020 to 59,980 kc/s.

### Calibrating a Set

By picking up an amateur on one of these bands you may hear him state his exact frequency and this is a valuable guide for calibrating purposes where a new set is being used for the first time. The amateurs often give their QRA, or address, and this will enable you in many cases to gain some idea of the efficiency of your set. It should be remembered, however, that on certain short wavelengths a peculiarity known as "skip distance" comes into effect and this may prevent you from hearing amateurs situated quite close to you, so don't be disappointed if you cannot hear an amateur replying whom you know is near to you. In view of the characteristic of the high-frequency signals the aerial and earth system must receive careful attention. You may find, for instance, that you can receive amateurs on the 7 mc/s (40 metre) band, but when you try the 14 mc/s (20 metre) band, you can get nothing, or reaction fails to function.

In this case look to the size of the aerial and the method of coupling it to the receiver. A short aerial should be used; it should be very well insulated at each end, and the earth should be really good. If these points are in order, then the wiring of the circuit should be attended to.

Remember that the aerial currents will take the easiest path to earth and accordingly keep all wires carrying the H.F. currents well clear of earthed objects,

screens, etc., and use the shortest possible wiring in this part of the receiver.

### Coils and Wiring

In this connection it should also be remembered that the leads from the tuning coil or coil holder to the tuning condenser form part of the tuned circuit and as the frequency increases (wavelength decreases) this extra wiring must obviously form a greater part of the circuit than on higher wavelengths. If care is not taken a point may be reached where the wiring is almost equivalent to the actual coil inductance, and this is obviously an unsatisfactory state of affairs. This is, in fact, one of the reasons why it is not advisable to attempt to make a receiver to tune from 5 metres up to above 20 metres. The coil for 5 metres will only consist of three or four turns of wire, and to enable as much of the wire as possible to be wound in the form of an inductance it is desirable to avoid a coil holder and mount the coil directly on the tuning condenser, mounting the valve holder in such a position that the lead to the grid terminal is also extremely short. Although these precautions are not essential on 20 or 40 metres, they will definitely play a part in the performance of the receiver, and the only point which has to be watched here is that the coil is kept clear of earthed metallic surfaces such as screens.

A further point in relation to the tuning of receivers below 10 metres is that any movement of connecting leads in the tuned circuit will affect the tuning adjustment and thus not only will erratic tuning adjustments be experienced, but it will be found difficult to tune the receiver one day and repeat settings the next.

### H.F. Chokes

One final component may be mentioned in connection with the short-wave receivers, and this is the H.F. choke. On the normal broadcast bands any old choke may be found to function—an ordinary resistance often being used in place of a choke. When we go down the scale, however, the efficiency of the choke will be found a vital factor in obtaining smooth and effective reaction.

Special short-wave and ultra-short-wave chokes are obtainable, as well as all-wave chokes, the latter generally being unsuitable for use below 10 metres. Remember that the function of the choke is to prevent the H.F. currents from passing out to the earth side of the anode load and to divert them through the reaction circuit. Although only a few turns of wire are needed for the choke, they must be on a well-insulated former, and it should be mounted as close as possible to the anode terminal of the detector valve—again remembering the previous details concerning the length of leads carrying H.F. currents.

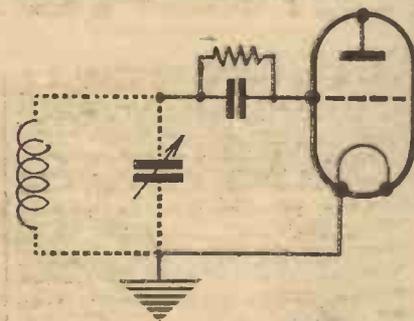


Fig. 2.—The broken lines in this tuning circuit indicate connecting leads and show how they form part of the actual tuning circuit.

efficiency components and low-loss construction in short and ultra-short wave apparatus.

### Amateur Transmissions

When a new short-wave set has been built one of the most convenient methods of testing it is to pick up an amateur transmission as there are usually plenty of these available and it is simpler to tune in these than to attempt to pick up American broadcast stations—although the receiver may actually have been built with this end in view. Amateurs will be found in separate "bands" in the wavelength scale and these

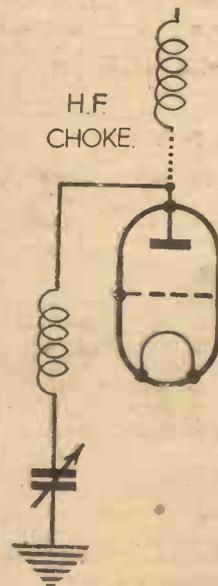


Fig. 3.—Wiring to the H.F. choke (broken line) carries H.F. currents and is therefore an important wiring link.

# Leaves from a Short-wave Log

## Honduras Calls

AT present there are only three short-wave radio transmitters operating in the Republic of Honduras (Central America) HRP1, at San Pedro Sula *el Eco de Honduras* works on 47.24 m. (6.351 mc/s) with a power of 100 watts. It is on the ether nightly from B.S.T. 19.00-20.00, and again from 01.45-04.00. HRD2, at La Ceiba, a 250-watt on 48.12 m. (6.235 mc/s) styles itself *La Voz de Atlantida*, opens its programmes with a Marimba foxtrot *Solo Tuyo*, and closes down with an electrical recording of the popular *Good Night Song* (Ted Lewis). Finally, HRN, in the capital city of Tegucigalpa broadcasting on 51.06 m. (5.875 mc/s), *La Voz de Honduras*, is the principal station, and is rated at 1 kilowatt. Its programmes are occasionally well received in the British Isles from midnight onwards, but the station is on the air from roughly B.S.T. 19.00 until 05.00 daily.

## Germany's Mystery Station

IT is reported that the exact location of the German short-wave transmitter (*Freiheitssender*), which has been operating for many months on channels around 29.8 m., has been discovered by the authorities, and that the plant has been dismantled, and the operators arrested.

## A Call from Haiti

HR2S, Port-au-Prince, which for some time had been working on 50.68 m. (5.92 mc/s) is now broadcasting on 49.37 m.

(6077 mc/s), the channel previously allocated to the Government station HHK. In addition to its sponsored programmes organised by the West Indies Broadcasting Company, this short-wave transmitter relays the entertainments of the medium-wave studio HHV in the Haitian capital.

## Have You Logged These?

A READER reports that he has picked up the call: *HZA station testing* on 23.45 m. (12.795 mc/s) towards B.S.T. 20.30. Although no details of this transmitter are given in the official Berne list, the call-sign would appear to be that of a station in Saudi Arabia. Another broadcast, in Spanish, on this occasion, was picked up on 44 m. (6.818 mc/s) at about the same time. The call heard was: *Aqui Benito, La Voz de Rio Muni*. This apparently emanated from the Spanish colony of that name on the West Coast of Africa. Lastly, on 48.5 m. (6.185 mc/s) the same reader states that he logged signals from a short-wave station situated at Blantyre (Nyasaland). Has any reader picked up any of these broadcasts?

## Explorers in the Tropics

AN expedition organised by the Government of Venezuela (South America) has started to explore the frontiers of Brazil and New Guinea. Under the call-sign YV9AB, this Expedition of the *Gran Sabana* (Grand Savannah) will install a

1-kilowatt radio station at its base camp, and transmissions giving details of its activities will be made daily from B.S.T. 12.00 on 14.125, 14.122, 7.285 and 7.221 mc/s.

## Romania versus Havana

TUNING-IN to 32.61 m. (9.2 mc/s) on a recent evening to secure a broadcast from the *Radio Nacional* station COBX, at Havana (Cuba), the writer of these notes logged an experimental transmission from Bucarest in which the call *Radio Romania* was repeated at frequent intervals. The transmissions have been heard on two or three occasions with an English news bulletin at B.S.T. 22.45.

## Radio Continental

CALLING *Radio Continental de Montevideo*, the voice of a woman announcer was well received recently after B.S.T. 22.00. The station is CXA2 at Montevideo (Uruguay), on 31.35 m. (9.57 mc/s), from which broadcasts are made daily from B.S.T. 16.00-04.00. The studio uses one stroke on a gong to denote intervals in the programme.

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# LETTERS FROM READERS

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication.)

**A Practical Programme Suggestion**  
SIR.—The B.B.C. would satisfy a long-felt want by instituting a series of short programmes solely devoted to practical and amateur wireless. I am of the opinion that a move of this nature would unfold endless possibilities in the form of entertainment for this class of radio enthusiast, as practical demonstrations could be given to show the various improvements which could be occasioned by certain adjustments to receiving sets and the use of sundry components.

Broadcasting House has often pointed out that its object is not merely to entertain, but to help towards improving the knowledge of the British public. Honestly, I can think of no better subject than this for discussion on the radio, as it strikes me as being of infinite importance that the listening community should be enlightened so that it can hear and enjoy the transmissions to the full through the medium of perfect reception.

Needless to say, the most favourable time of day for such broadcasts would give rise to many questions, and not a few headaches. I think it would be safe to say that the late gramophone session on Saturdays would meet with most listeners' wishes. This is the enthusiasts' time for experiments and knob-twiddling, and would not seriously impede the usual programmes.  
—ERIC L. ADLEM (Notting Hill, W.11).

## Station G2CZO

SIR.—As a regular reader of PRACTICAL AND AMATEUR WIRELESS, I enclose a description and photo of my station. I have been a reader of your journal for several years, and would like to correspond with any reader on the "Gold Coast," or South Africa.

The call sign of my station is G2CZO, located at 22, Mandale Road, Thornaby-on-Tees, Yorkshire. The photograph will give some idea of the layout of the station. The transmitter (on the left) is COPA—of the ten-watt class. The power supply is housed in the lower part of the rack, while at the extreme top can be seen the A./A. equipment.

On the table can be seen the receiver, C.W. monitor, 'phone monitor and wave-meter.

The receiver is a Phillips all-wave export model and covers a range of 9 to 2,400 metres—the circuit being 1.V.1. Pen. A close watch is kept on all bands, and the operator is willing to co-operate in tests with any station.—V. SPENCE (G2CZO) (Thornaby-on-Tees).

## Logged on 14 mc/s

SIR.—In the issue of PRACTICAL AND AMATEUR WIRELESS for April 29th, you published a log from us of stations we had received during the 14 mc/s. DX contest. Since then we have re-built the set used at that time with an improved layout, extension rods, etc.

Below is our log for that band during the first week of listening after the rebuilding (May 6th-13th), which, in spite of the short skip distances and bad conditions generally during this period, makes a rather interesting comparison. The aerial used was the same 75-foot long inverted "L" NE-SW.

F (11); I (8); CT (18); CN (8); SV (3); SU (5); OZ (4); OH (3); SM (16); SP (6); HA (7); FA3JF, 8 CF; LY1BF; HB9DE; LAIG; YL2DV; ES5C, E;



A corner of station G2CZO, operated by V. Spence, of Thornaby-on-Tees.

ZB1E, L; PA0PA; U3BX; EK1AF; W1 (18); W2 (16); W3 (4); W4 (4); W8 (3); W9QI, PTY; VE1VK, CR; PY1 (4); PY2 (6); PY4 (4); PY6AD, AG; PY7AE; K4EJF; VP6FO; VP3CO; VP2DM; LU7AG, 3DF; CX2CO; OQ5CC; VQ2CM, F; ZE1JA; ZSIT, JP; ZS2AX, AZ, BJ; ZS5BG, Q; ZS6EO, EF; VU2FA; VS7RA; ZC6HF; FN1C; KA1ME, FH, 2KK; VK4PF; FB4AN; FM5KP; and FM3MX.—G. J. OWEN and C. CLIFFORD (Cheltenham).

## S.W. Superhet for Overseas Use!

SIR.—Referring to Mr. P. Ganesa Iyer's letter, published in your paper dated April 29th, 1939, I may say that the designs of receivers as desired by him would be highly appreciated by your Indian readers, and would be just right for satisfying every requirement of Indian listeners.

I am afraid, however, that if the wave-range requirements as desired by Mr. Iyer are adhered to, the receivers would be too expensive. I, therefore, propose that in order to reduce the cost a range of 18 to 65 metres, and 195 to 550 (or, say, 450) metres would just be enough. As this could be covered with two coils only, the

switching arrangement would be simple and cheaper. As the 90-metre transmissions have not proved as successful as the 60-metre ones, the broadcasting authorities have given them up, and as far as I know they do not propose to revert to them.

I do not think that an A.C./D.C. receiver is absolutely essential when a separate A.C. design can be published, but I think that a D.C. receiver with 0.1 amp. valves would just meet the requirements, and as its current consumption will be about 60 per cent. less than that of the American receiver, it is expected to become very popular with the Indian listeners. The electrical energy costs from 4½d. to 9d. per K.W.H., the latter being the rate in the majority of the cities. It is, therefore, desirable that the consumption of the receiver may be kept as low as possible. For receivers other than the D.C. receiver, I think the American valves, or their Octal base English counterparts may be safely used.

In order that the receivers may well compete with the factory-built American sets it is essential that the price for mains sets should remain in the neighbourhood of £3 to £3 10s., it is therefore essential that all the tuning coils including the I.F. transformers and H.F. chokes, may be home-made components.

I am a regular reader of your paper from the first issue, and have no hesitation in saying that this is the best paper of its kind I have come across. Wishing it every success.—B. K. BHATNAGAR (Delhi, India).

## A Correction

IN a recent issue we published a letter from a reader residing in Kenya, and inadvertently his address was given as Kenya, S. Africa. We wish to state that our staff has not discovered a new colony, and the address should have been given as Kenya Colony.

## CUT THIS OUT EACH WEEK

# Do you know

—THAT although clockwork mechanisms may be used for slow-motion drives they may prove noisy (electrically) on short waves.

—THAT aluminium screens for L.F. chokes and transformers are only effective from an H.F. point of view.

—THAT the current flowing through a fixed resistor should be carefully calculated when choosing this type of component.

—THAT the adjustment of an aerial series condenser will affect tuning settings and also control the effect of aerial damping.

—THAT the position of a speaker in a small self-contained receiver should be carefully chosen as the field may be quite large.

—THAT peculiar effects may be experienced if a valve is placed within a speaker field.

—THAT voltage dividers may be made up from separate components and form useful H.F. adjusters for multi-valve receivers.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

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# RADIO IN AVIATION-6

In this Concluding Section the Problems of Listening-through and Electric Shocks are Dealt With

**E**XHAUSTIVE trials made by the Air Ministry showed that the valuable feature of automatic and instantaneous change-over was offset by lack of reliability due to any or all of the following causes: (A) The difficulty of applying a background suppression when the background is subject to sudden change, such as when the pilot turns his head and when engine speed is altered or when guns are fired. (B) The failure of electrolytic condensers at low temperatures. (C) The reduction of speech level at high altitudes.

A solution may perhaps be forthcoming in the future, but at present the conditions would appear to be very unpromising.

## Electric Shock

In an aircraft installation, involving the presence of H.T. voltages of the order of 1,200 volts in close proximity to the appliances used by the operator, substantial insulation of ground standards is ruled out, and great care is therefore necessary in planning the design and particularly the lay-out of circuits. The very small factors of safety which have to be accepted in the design of H.T. switches and components necessitates the use of circuits which in case of breakdown are incapable of directing high potentials into the components handled by the operator, namely, the telephones, microphone, key, and aerial winch. This requirement is met by keeping the microphone, key and telephones all at the same potential by connecting them to the filament battery and to earth. This ensures that no appreciable potential-difference can occur between these parts and the structure of the aircraft. Danger from the aerial winch is eliminated by the insertion within the transmitter of a blocking condenser of high insulation in series with the aerial terminal. There only remains, in the latter case, danger of unpleasant burns should the operator touch the aerial circuit with the power on and the key depressed.

To show the seriousness of the shock danger, the case may be quoted of a fatal accident which occurred through the unhappy coincidence of a number of faults all essential to establish dangerous conditions. First, the operator was wearing an ordinary metal-strapped telephone receiver; secondly, the generator was wrongly connected, thus cutting out the field regulator; thirdly, the windmill used on the generator was of too fine a pitch; fourthly, the ordinary electric battery supply was used instead of a special and separate one for the filaments; fifthly, the operator's boots were wet. During the flight the operator observed that his generator volts were excessive, the value being probably about 2,000 volts, and that the regulator had no effect upon it. He apparently went down on his knees to examine the generator (which was of the retractable type). The heavy overload he had previously applied to the set had caused an arc across the key and a breakdown in the send-receive switch between H.T. positive and receiver H.T. This had applied 2,000 volts to his telephones, the circuit being complete through his body to a bolt in the floor by way of his wet boot.

In modern installations this possibility is eliminated by the provision of highly

insulated telephones, completely enclosed telegraph keys, and insulated microphones. In addition, safer circuits are employed. Any breakdown of the H.T. positive occasions a short-circuit of the H.T. generator, which may burn out but will not occasion danger to the operator.

## Eliminating Microphone Shock

There is another form of shock which, while constituting no danger, can be particularly unpleasant; this is caused by high-frequency potentials of low value which are led into the microphone. When the mouthpiece is damp the operator perceives a slight burning sensation, which is decidedly more than a tingle and is particularly unpleasant. As it is impossible to ensure that all earthy components are at exactly the same potential, the occurrence of this effect is normally prevented by the insertion of high-frequency chokes in the microphone leads. In particularly difficult installations on aircraft built partly of wood and partly of metal it is frequently necessary to insert chokes in all leads from the transmitter to the external accessories. When the transmitter is intended to cover the short-wave band as well as the medium, the choke

Previous Articles in this Series were given in our issues for April 22nd and 29th; May 13th, 20th and 27th

system may become very complex and a source of troublesome resonances. In this respect the modern all-metal construction has practically eliminated the problem of external lead resonances.

Reference has already been made to the insertion of a series condenser in the earth lead for the purpose of reducing the load of the earth or counterpoise. This electrically satisfactory possibility is unfortunately inadmissible from the point of view of risk from shock. In the event of the H.T. positive going to earth the full potential of the supply becomes connected between the metalwork and the microphone and telephones, the insulation of which may not perhaps be quite adequate. To reduce this danger an attempt was made to shunt the series condenser with a resistance of the order of a few hundred ohms, but the residual high-frequency voltage on key and microphone brought in complications which, in view of the wide frequency band required, chokes could not cure. In isolated cases where microphones were not used, the arrangement was found practicable, but its use has been discontinued. The chief reason for abandoning it was the fact that metal cases enclosing the apparatus, and particularly mechanical remote controls, had to be insulated from earth and were a fruitful source of maintenance difficulties.

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**Abstracts Published.**

**LOUD-SPEAKERS; MAGNETS.**—Bosch Akt.-Ges., R. No. 499830.

In a magnet assembly for a loud-speaker comprising an annular permanent magnet *b*, Fig. 1, the area of the surface between the annular magnet and the outer edge of the air gap *f* between the centre pole-piece *d* and the outer pole-plate *c* is of the same order of magnitude as the cross-sectional area of the air gap. The diameter of the pole-piece *d* at a point *g* immediately below the pole-plate *c* is less than that of the portion within the gap *f*. The permanent magnet *b*, which is secured to the pole-plate *c* and to a base-plate *a* by welding at the points *e*, may have its inner and/or its outer surface taped.

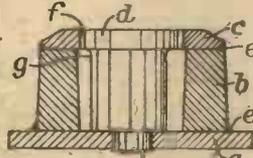


Fig. 1.

**VALVE CIRCUITS FOR WIRELESS RECEPTION; MECHANICAL SWITCHES WITHOUT QUICK ACTION.**—Marconi's Wireless Telegraph Co., Ltd. No. 499963.

A reaction oscillator, particularly for use in a superheterodyne receiver, is provided with a wave-range switch 33, (Fig. 2,) whereby for each range one of the three secondary windings 30, 31, 32 of the feed-back transformers is made effective together with two adjacent windings selected from the four primary windings 55, 56, 57, 58, one of the primary windings being tuned above the selected range and the other below it, in order that the feed-back may be substantially uniform throughout the range. When the switch 33 is set for the highest

range, as shown, the secondary winding 30 is connected to the control grid of the oscillation-generating pentode 5 with the tuning condenser 14 in shunt, while the condenser 83 tunes the winding 55 above, and the winding 56 below the selected frequency range. The remaining windings, 31, 32, 57, 58 are short-circuited. In the next position of the switch (not shown), the intermediate range B is selected, and the winding 56 now serves as the upper-frequency primary for the secondary winding 31, which becomes connected to the tuning condenser 14, the lower-frequency primary being the winding 57. The primary coils 56, 57 are now tuned by the condenser 85, the windings 32, 58 are short-circuited, and the high-frequency winding 55 is left in circuit. When the switch 33 is set for the lowest range A (not shown), the windings 57, 58 serve as the higher- and lower-frequency primary windings for the secondary winding 32. Stability throughout the selected range is enhanced by reducing the grid capacity 12, and changing the grid resistance 11 correspondingly.

Electric switches. In the rotary switch 33, fixed contacts such as 85 are adapted to engage the rotatable segments 68, 42 and 73, 43. The latter pair of rotatable segments can also engage the fixed segments 69, 70, 44, 45, which lie below the rotatable segments 68, 42 but do not engage them.

Electric transformers. The four primary windings 55, 56, 57, 58, with inductances increasing in the order stated, are coupled in pairs to the three secondary windings, 30, 31, 32 on the same former 53 (not shown) and can be selectively made

effective by means of a switch. The turns of the primary coil 55 are interleaved with those of the secondary coil 30 as shown in Fig. 3; close magnetic coupling is thus provided while capacity coupling is kept down as a result of the difference in size between the conductors.

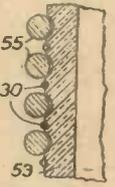


Fig. 3.

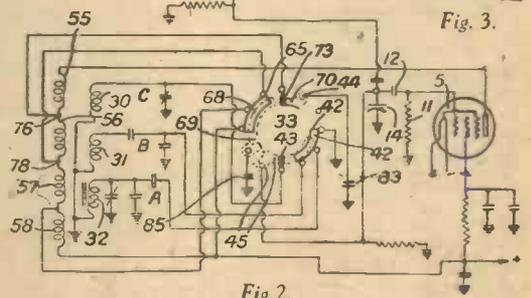


Fig. 2.

## TELEVISION OUTSIDE BROADCASTS

THE value of outside broadcasts as part of the daily television service has been emphasised many times in these columns and tribute to the success achieved by the B.B.C. in these matters has also been recorded. Their prime interest undoubtedly lies in their topicality, and since the events which the viewing public would like to see occur in so many widely separated places, there is always the problem of how to feed the radio transmitter at Alexandra Palace with the modulation signals derived from the source where the event occurs. Three schemes have been used up to the present, namely, a directional ultra-short-wave radio link working on a carrier frequency of 64 megacycles; the coaxial television cable, long runs of which have already been laid in London; and ordinary telephone cable working in conjunction with special termination equipment to overcome the frequency and phase distortion. The development of the last-named method as an outside broadcast link has enabled many items to be televised which otherwise would have been barred to the television camera. If any attempt was made to use coaxial cable throughout, the expense involved would be prohibitive, quite apart from the fact that there is a serious time factor involved in laying the cable in suitably-placed ducts. In the case of the radio link where a clear, high open space can be found for the telescopic aerial and van, the results are generally quite satisfactory. In the town districts, however, parking facilities for three or four vans may prove difficult, while there is always a possibility of picking up some form of electrical interference, and unless the aerial can tower above neighbouring buildings, signal strength is reduced, and reflections from neighbouring objects may produce those annoying multiple images. The success which has been achieved by the B.B.C. in using telephone lines up to about 3 to 5 miles long has proved a saving factor, for there is nearly always spare lines available in the vicinity of an O.B., and, of course, the cost is very materially reduced. After months of experiment the engineers have evolved very intricate balancing and repeater apparatus, so that the very high modulating frequencies of the television picture signal can be handled by the Post Office cable, and if only this could be extended over long distances, then provincial television extensions would have their biggest difficulty solved.

## NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents and are published by permission of the Controller of H.M. Stationery Office. The Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1/- weekly (annual subscription £2 10s.).

**Latest Patent Applications.**

- 13235.—Aga-Baltic Radio Aktiebolag.—Automatic tuning arrangements. May 3.
- 12840.—Cole, Ltd., E.K., and Knipe, A.R.—Tuning-apparatus for radio-receivers, etc. April 29.
- 12626.—General Electric Co., Ltd., and Jesty, L. C.—Apparatus for transmitting etc. coloured television. April 27.
- 13024.—Jackson, D., and Pyc, Ltd.—Television apparatus. May 1.
- 13024.—Jackson, D., and Pyc, Ltd.—Screening arrangements for radio, etc. May 1.
- 13277.—Kramolin, L. L. de.—Superheterodyne receivers. May 3.
- 13278.—Kramolin, L. L. de.—Automatic tuning arrangement. May 3.
- 12820.—Marconi's Wireless Telegraph Co., Ltd.—Tuning indicating circuit arrangements for radio, etc., receivers. April 28.
- 12989.—M-O Valve Co., Ltd., and Aldous, W. H.—Thermionic valves.
- 12976.—Scophony, Ltd., and Okalic-

sanyi, F.—Cathode-ray tube television receivers, etc. May 1.

**Specifications Published.**

- 504616.—Marconi's Wireless Telegraph Co., Ltd.—Radio-receiving systems.
- 504560.—Cole, Ltd., E. K., and Brooke, H. A.—Superheterodyne radio receivers.
- 504733.—Marconi's Wireless Telegraph Co., Ltd., Wells, N., and Ladner, A. W.—Aerial and associated feeder systems.
- 504629.—Farnsworth Television, Inc.—Electron multipliers, and circuits utilising them.
- 504573.—Gardner, B. W.—Device for use in wireless receiving-apparatus.
- 504668.—Scophony, Ltd., Wikkenhauser, G., and Thomson, A. F. H.—Television transmission apparatus.
- 504421.—Aga-Baltic Radio Aktiebolag.—Radio-receivers or other radio-frequency amplifiers provided with automatic volume control.
- 504526.—Farnsworth Television, Inc.—Image analysing and dissecting tube for television systems.
- 504533.—Photo Electrograph, Ltd., and Frater, J. P.—Electric picture reproducing means.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.

# INCREASING L.F. GAIN

THE following idea relates to active impedance networks, and is concerned with such networks possessing two terminals and offering a low impedance path to direct currents.

One object of the idea is to provide such a network appearing as a large inductance to varying currents. Such a network is also provided, appearing as a high resistance, or as a large capacity, or as a large negative resistance to varying currents. The network is provided also, whereby a comparatively high resistive impedance is presented to more rapidly varying currents and a comparatively low impedance to more slowly varying currents.

Another use is to provide such a network offering a comparatively low resistive impedance to more rapidly varying currents and a comparatively high impedance to more slowly varying currents.

The suggestion is of application to thermionic amplifying circuits where it permits of a large gain from a given stage without the use of a very high supply potential. It is also of application where a highly inductive choke is required.

Thus it may be applied in television scanning circuits, or it may be applied to smoothing circuits. It may also be applied to smoothing circuits in which very large capacities are required. It has further application to frequency discriminating networks and to oscillator circuits.

In order that the suggestion may be more clearly understood reference should be made to the accompanying illustrations in which Figure 1 shows the network in a diagrammatic form; and Figure 2 shows one practical embodiment.

Referring to Figure 1, T<sub>1</sub> and T<sub>2</sub> are the terminals of the network and z is an impedance capable of passing direct current, connected in the cathode circuit of the valve V so as to form one branch of the network. Z<sub>1</sub> and Z<sub>2</sub> are impedances forming the other branch of the network and their join is connected to the grid of the valve V.

If a and g represent respectively the anode conductance and the grid mutual conductance of the valve V<sub>1</sub> then it may be shown that the impedance between the terminals T<sub>1</sub> and T<sub>2</sub> is given by the expression:

$$Z = \frac{1 + (a + g) z}{a + g \left( \frac{Z_2}{Z_1 + Z_2} \right)} \dots \dots \dots (1)$$

provided that the magnitude of this expression is considerably less than the magnitude of the impedance Z<sub>1</sub>. If this condition does not hold, the impedance of the network is given by the above expression for Z only diminished in the ratio:

$$1 : 1 + \frac{Z}{Z_1 + Z_2}$$

It will however be sufficient for the purposes of illustration to consider only the expression for the impedance of the network contained in equation (1).

Referring to the expression for Z given

by equation (1) it will be clear, of course, that the properties of Z depend on the character of the impedances from which the expression is constructed. Before, however, proceeding to illustrate these properties it may be pointed out that especially when the valve V is of the screen grid type, which is a preferred case, the magnitude of the anode conductance a is very small compared with the grid conductance g so that equation (1) may be simplified slightly to—

$$Z = \frac{1 + gz}{a + g \left( \frac{Z_2}{Z_1 + Z_2} \right)}$$

From this equation it will be clear that by suitably choosing the values and nature of z, Z<sub>1</sub> and Z<sub>2</sub> the impedance Z may be made to assume the various characters referred to above. z may be made, for instance—and this is the simplest case—a purely resistive impedance; then if Z<sub>1</sub> is made resistive and Z<sub>2</sub> capacitive, the impedance Z becomes inductive, the case to which Figure 2 corresponds; a similar effect is obtained if Z<sub>1</sub> is made inductive and Z<sub>2</sub> resistive. If Z<sub>1</sub> is made resistive and Z<sub>2</sub> inductive, or if Z<sub>1</sub> is made capacitive and Z<sub>2</sub> resistive, the impedance Z becomes capacitive. Modifications leading to other results already referred to are obtained by arranging for z to be inductive or capacitive in nature, or to be a tuned reactor impedance; the effects obtained with the various combinations may be derived from the above equations.

The network as described in accordance with the suggestion is of wide application, though the idea is not to be regarded as

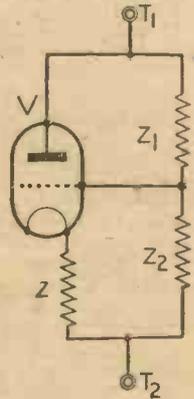


Fig. 1. An impedance network in diagrammatic form.

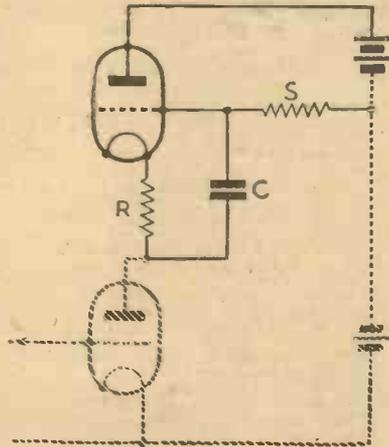


Fig. 2. A practical interpretation of Fig. 1.

limited to a few examples. The circuit is capable of application at frequencies where the inter-electrode capacities are of importance, provided suitable steps are taken, either to incorporate these capacities into the network or effectively to neutralise them.

### Footissimo

READERS will probably like to know that Reginald Foort is writing his adventurous life story in *Tit-Bits*. This week he tells of his early days at cinema playing, of the first great cinema organ brought to Britain, of million-sale gramophone records, and of the broadcasts that brought him fame.



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## RADIO CLUBS & SOCIETIES

Club Reports should not exceed 200 words in length and should be received First Post each Monday morning for publication in the following week's issue.

### SOUTH LONDON AND DISTRICT RADIO TRANSMITTERS SOCIETY

Headquarters: West Norwood Brotherhood Hall (opposite W. Norwood bus garage).  
Hon. Sec.: H. D. Cullen (G5KH), 164, West Hill, London, S.W.15.

Meetings: First Wednesday every month.  
THE principal feature of the past quarter's activities of the above Society was a demonstration of X-ray apparatus by Mr. Stone, G2ZL. He gave a comprehensive account of the development of X-rays, from their discovery by Röntgen to present-day practice. An especially interesting feature was the home-made 50,000 volt transformer.

Future programme.  
June.—General discussion on Aerials.  
July.—Grid Controlled Rectifiers.—Mr. Nixon, G.E.C.  
August.—Television Receivers.—Mr. Wright.

### INTERNATIONAL SHORT-WAVE CLUB (LONDON)

Headquarters: R.A.C.S. Hall, Cavendish Grove, Wandsworth Road, S.W.8.

European and Colonial Representative: Arthur E. Bear, 100, Adams Gardens Estate, London, S.E.16.

QUITE a number of interested people attended the meeting of the London Chapter of this organisation held at the R.A.C.S. Hall, Cavendish Grove, Wandsworth Road, S.W.8, on Friday evening, May 19th. The occasion was the third in the series of television demonstrations. Mr. E. Burnett described a Pye sound and vision receiver in every detail. The receiver being in chassis form facilitated the work of instruction. Members expressed the opinion that television receivers are being made more compact, and easy to service. Several receivers were used in the demonstration that followed, and excellent results were obtained. It was also shown that results can be quite good in a hall where the full usual lighting is used, and it was remarked that this does not cause any eye-strain when watching the picture. All readers are invited to come along to the Friday evening meetings, membership to the Chapter being free.

### BRISTOL EXPERIMENTAL RADIO CLUB

Headquarters: Kings Corridor, Old Market Street, Bristol, 1.

Hon. Pub. Manager: D. J. James (2DCX), 40, Robertson Road, Eastville, Bristol, 5. Phone 56404.

THE recently formed Bristol Experimental Radio Club held its first meeting on May 2nd. A committee of seven, including Mr. A. A. Uppington (2BAR) as Chairman, Mr. C. R. Davis (2FVG) as Hon. Sec., and Mr. A. Taylor (BRS3564) as Treasurer, were elected.

The aim of the Club is to assist members with their experiments, and to provide them with an interesting and instructional evening, once per month during the summer, and once every fortnight during the winter. Meetings will be held on Tuesday nights at 8 p.m. Special attention will be paid to constructing, operating and experimenting with:—

- Short-Wave Receivers.
- Amateur Transmitters.
- Amplifiers and Modulators.

The next meeting will take place at the club headquarters on June 6th, when a representative selection of communication receivers will be described, demonstrated and discussed.

All experimental radio enthusiasts of the district are cordially invited. The publicity manager will be pleased to provide anyone interested with further particulars.

### EDGWARE SHORT-WAVE SOCIETY

Headquarters: Constitutional Club, Edgware.  
Secretary: F. Bell, 118, Collin Crescent, Hendon, N.W.9.

THREE members have now obtained their licences, making a total of 18 fully licensed members in the club. Mr. P. A. Thorogood, chairman, has obtained G4KD. Mr. F. Bell, secretary, has obtained G4JU. Mr. M. Pugh, G4JD. Several other members are applying for their full calls. The debate on May 10th—"Phone versus C.W.—between G2AI and G2IM ended in a draw after an exciting start. It was however agreed that C. W. should be separated on the band from phone, the latter having two-thirds.

Future meetings are 5-metre field day arrangements, R.S.G.B. field day preparations, and lecture by Dr. Smith on Telcon cables.

### SALE AND DISTRICT RADIO SOCIETY

Meetings: Held weekly on Thursday evenings at St. Mary's School, Barker's Lane, Sale, near Manchester.

Secretary: S. C. O. Allen (2FCQ), 31, Ennerdale Drive, Ashton on Mersey, Sale. Telephone: Sale 2651.

A SERIES of lectures on the theory of radio receivers and transmitters has been arranged—the first is to be given by Mr. N. Postles.

Morse practice takes place at every meeting, and this is followed by an informal discussion on technical difficulties met with by individual members.

One member, Mr. G. F. Taylor, has been informed by the Post Office that his application for an Artificial Aerial Licence has been successful, and he is now waiting the issue of a call-sign.  
New members will be welcomed.

### HODDESDON AND DISTRICT RADIO SOCIETY

Headquarters: Blaigrowrie, Station Road, Broxbourne, Herts.

Hon. Sec. and Treasurer: T. Knight, Jnr., Caxton House, High Street, Hoddeston, Herts.

ON May 10th Mr. Jackson of Bishop's Stortford came over with his home-built television receiver and gave us an exceedingly interesting lecture and demonstration.

On May 21st we are having a field day on 1.7 mc/s with specially built gear, including two 30ft. portable masts.

Mr. H. Jones is now G4HJ and 2DXO has applied for his full call. Recent meetings have been devoted to ultra-short wave receivers and D.F. work.

## BOOKS RECEIVED

**PRINCIPLES AND PRACTICE OF RADIO SERVICING**, by H. J. Hicks, M.S. 305 pp. 21s. Thus. Published by McGraw-Hill Publishing Co., Ltd., price 18s.

THIS handy text-book has been written especially for servicemen, and owing to the use of the minimum of mathematical calculations it will be found of the greatest use to experimenters and others who need such a book. The chapters deal with the Fundamentals of Magnetism and Electricity; Fundamentals of Radio; Radio Valves; Test Equipment; Theory of H.F. amplifiers; Theory of L.F. Amplifiers; Power Supplies; Systems of Detection; Volume, Tone and Frequency Control; Loudspeakers; Aerials and Elimination of Man-made Static; Super-heterodynes; Servicing Radio Receivers; Public Address Systems; The Business Side of Radio Servicing; and an 18-page Appendix. This includes Abbreviations, the Greek Alphabet and Symbols, and other valuable data likely to be useful to a student. The book is very well written, and explains clearly all of the phases of the various sections of modern radio apparatus.

### Radio Marketing Trade Annual

1939 Radio Marketing Trade Annual, published by the "Radio and Electrical Marketing," 29, Bedford Street, Strand, W.C.2. 192 pages, price 5s., post free.

THIS annual covers every aspect of the radio industry, and appears in three sections, Commercial and Legal, Technical, and Directory; these being printed on white, yellow, and green paper, respectively. If you want details of radio associations and societies, alphabetical directories of manufacturers, wholesalers, etc., a voltage directory of the United Kingdom, or if you want to know Who's Who in the Radio Industry, you will find it all in the Directory Section. The Commercial and Legal section contains a survey of dealer guarantee and maintenance schemes, an outline of the successful methods and principles adopted by dealers who have had practical experience of canvassing, and deals with the Post Office Telephone Relay Service, while the H.P. Act, 1938, is explained by S. W. Magnus, barrister-at-law. A feature of the technical part of the annual is a complete new television servicing section, occupying 32 pages, with theoretical and practical chapters on such subjects as The Eye and the Emitron, the Cathode-Ray Tube, Synchronising, Aerials, Receivers Sectionalised, and the Vision Receiver. You will find all the information you need on automatic tuning in the complete new section of ten pages, sub-divided into six chapters, on this subject.

There are hundreds of problems, always cropping up during the course of the day, that can easily be settled with the aid of this useful annual.

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# QUERIES and ENQUIRIES

## By-pass Condenser Connections

"I note that in certain battery receivers you use a resistance in the anode circuit of a valve and connect a large condenser from the anode side of the resistance to earth. I understand that this is a decoupling circuit, but it appears to me that the condenser is virtually in parallel with the resistance, and surely this would be a more efficient way of connecting the condenser than straight to earth. I wonder if you could tell me why the direct earth connection is usually employed."—F. Y. T. (Blackpool).

## High Voltage Mains Units

"I am very interested in mains apparatus and notice the various schemes for obtaining high voltage in the usual radio and television apparatus. I am interested in the method of obtaining the very high voltages needed for X-ray apparatus, and wonder if you could let me have any details. I know that metal rectifiers are used in television apparatus, but these only deliver very small currents."—L. E. (Leigh).

SPECIAL valves are used for the purposes mentioned, and these are known as the E.H.T. class (Extra High Tension). The valves employ special tungsten filaments and are used singly, or in special voltage doubling and trebling circuits. A booklet dealing with the valves and circuits may be obtained from the General Electric Company.

## H.F. Volume Control

"I have tried to make up an H.F. unit with a mains variable- $\mu$  H.F. pentode. I have used a variable resistor in the S.G. potentiometer circuit, with the usual bias fixed resistor in the cathode lead. I find, however, that no matter how I modify the connections to this part of the circuit I cannot control the volume down to a whisper. Is there any snag in this particular type of circuit?"—S. T. R. (Barnsley).

PROVIDED that the correct values are used the circuit should function. It is necessary to make certain that the H.T. voltage is correct if you have adopted the makers recommended values for the circuit, and these will, of course, only apply when a given H.T. voltage is used. You may, of course, have mounted the control on a metal bracket or panel in such a manner that it is short-circuited. You may, on the other hand, find it necessary to modify the values so that a much higher bias may be applied to the valve to give you the desired cut-off. Remember, the higher the bias the weaker the signal.

## Continuity Tester

"I wish to make up a small tester so that I can test components such as coils, chokes, etc., for breakage. I have a 0.5 milliammeter and think that this could be employed, but am not certain regarding the proper method of doing this. Could you give me a circuit and instructions for making a suitable unit."—M. W. (Bexhill).

ALL that should be necessary is a small battery in series with your meter using one side of the meter and the free side of the battery as "test prods." Precautions must be taken to ensure that the total current flowing through the entire circuit will not rise above the maximum reading of the meter and, therefore, probably the best plan, especially if you wish to test certain high-resistance components, is to use two standard 9-volt G.B. batteries wired in series and included in series with a 5,000 ohm resistor and the meter.

any new parts. Can I use any of these to make an adjustable tone control for my special purpose?"—L. S. (Romford).

YOU can certainly make use of your components effectively in the following manner. A fixed resistance with a value between 10,000 and 50,000 ohms should be joined to the anode of the output valve. The other side of this resistance should be joined to a wander plug or tapping clip. Four or five fixed condensers may be then joined to the H.T. positive line and the other sides of the condensers connected to a row of sockets or merely left empty—the tapping clip in this case being clipped on to the condensers in turn to obtain the desired tone regulation.

## A Workshop Hint

"I was trying to make a special slow-motion drive which I had designed 'on paper,' but owing to my lack of workshop experience I find it difficult to drill certain holes for tapping without breaking through. I am using a large piece of ebonite and wish to mount a brass strip on it, 4B.A.  $\frac{1}{2}$ in. bolts to be used. Obviously I only need a shallow hole in the ebonite, but I drill either too shallow and the tap then breaks the ebonite when it meets the bottom, or else I drill too far and break through the other end. What is the best way of gauging the depth of these holes."—L. S. W. (N.W.5.).

THERE are two or three methods, the simplest being to lock a small collar on the drill so that only the required length of drill protrudes. Alternatively, you can cut a short length of tubing to slip over the drill so that it meets the chuck and again leaves only the required length of drill unprotected. A rougher scheme is to mark a short length of rod with a scratch at the required distance and to drill very slowly, continually removing the drill and putting the depth gauge into the hole—after the manner of using a dip-stick in a petrol tank, for instance.

## RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporaries.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.
- (5) Grant interviews to querists.

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.

Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

YOU are quite correct in saying that the condenser is virtually in parallel with the decoupling resistance, but it is also necessary to remember that it is also in parallel with the H.T. battery or supply. If the condenser is joined directly across the resistance as you suggest, it will certainly by-pass H.F. currents, but there is still the H.T. supply to be passed before earth is reached, although the battery is at earth potential. As there may be a high resistance in the battery this will prevent adequate by-passing of the H.F. currents and, therefore, it is not only preferable, but desirable, to take the condenser direct to earth—and a really efficient earth connection should be used.

## Tone Control

"I find that high notes are over-emphasised on my pentode output stage, and I wish to fit a tone control. In looking through various back numbers I see that the usual scheme is to use a fixed condenser and variable resistor, but I have a number of fixed condensers and fixed resistances and would like to try them out without buying

## REPLIES IN BRIEF

The following replies to queries are given in abbreviated form either because of non-compliance with our rules, or because the point raised is not of general interest.

M. B. (N.1). The trouble may be due to an inefficient aerial system or a faulty receiver. Further details are necessary to give precise information.

F. S. R. (N.W.6). The matching will be substantially correct and the difference between your load and the correct one would be inaudible.

G. J. M. (Bristol, 4). The valve does not appear in current lists, and you should write to the makers for full details.

G. J. (Belfast). The valve is the special Hivac DB.240. There is no substitute, and the price was 15s. 6d.

H. A. G. (E.17). The items you mention are obtainable from Messrs. Peto-Scott.

F. D. (Bradford). The terms are synonymous. In one case the name describes the actual apparatus, and in the other it describes the purpose for which it is mainly used.

J. B. (Birmingham, 14). As the issue is out of print we regret that we cannot supply the diagram. The blueprint gives all details.

J. B. (New Oscott). The price of the records is 3s. each (5s. the set). An earth is not essential, but is highly desirable.

A. P. J. (Hereford). There is nothing to be gained by using the choke. In fact, it would be undesirable to include this as the additional iron circuit may introduce distortion.

W. S. (Cambridge). The type of coil referred to is a two-pin plug-in model of the old pattern. A simple relay or converted bell movement should be used. The resistance depends upon the circuit arrangement.

## PRACTICAL MECHANICS HANDBOOK

By F. J. CAMM

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<b>STRAIGHT SETS. Battery Operated.</b>				
<b>One-valve : Blueprints, 1s. each.</b>				
All-Wave Unipen (Pentode)	..	—	PW31A	
Beginners' One-Valver	..	19.2.38	PW85	
The "Pyramid" One-valver (HF Pen)	..	27.8.38	PW93	
Two-valve : Blueprints, 1s. each.	..	—	—	
Four-range SuperMag Two (D, LF, Pen)	..	—	PW30B	
The Signet Two (D & LF)	..	24.9.33	PW70	
<b>Three-valve : Blueprints, 1s. each.</b>				
The Long-range Express Three (SG, D, Pen)	..	24.4.37	PW2	
Selectone Battery Three (D, 2 LF Trans)	..	—	PW10	
Sixty Shilling Three (D, 2 LF RC & Trans)	..	—	PW34A	
Leader Three (SG, D, Pow)	..	—	PW35	
Summit Three (HF Pen, D, Pen)	..	22.5.37	PW37	
All Pentode Three (HF Pen, D, Pen)	..	29.5.37	PW39	
Hall-mark Three (SG, D, Pow)	..	12.6.37	PW41	
Hall-mark Cadet (D, LF, Pen (RC))	..	16.3.35	PW48	
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	..	13.4.35	PW49	
Genet Midget (D, 2 LF (Trans))	..	June '35	PM1	
Cameo Midget Three (D, 2 LF (Trans))	..	8.6.35	PW51	
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) Battery All-Wave Three (D, 2 LF (RC))	..	—	PW53	
The Monitor (HF Pen, D, Pen)	..	—	PW55	
The Tutor Three (HF Pen, D, Pen)	..	21.8.30	PW61	
The Centaur Three (SG, D, P)	..	14.8.37	PW64	
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	..	31.10.36	PW69	
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	..	18.2.39	PW72	
The "Rapid" Straight 3 (D, 2 LF (RC & Trans))	..	4.12.37	PW82	
F. J. Camm's Oracle All-Wave Three (HF, Det., Pen)	..	28.8.37	PW73	
1938 "Triband" All-Wave Three (HF Pen, D, Pen)	..	22.1.38	PW84	
F. J. Camm's "Sprite" Three (HF Pen, D, Tet)	..	26.3.38	PW87	
The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	..	30.4.38	PW89	
F. J. Camm's "Push-Button" Three (HF Pen, D, Pen) (Tet)	..	3.9.38	PW92	
<b>Four-valve : Blueprints, 1s. each.</b>				
Sonotone Four (SG, D, LF, P)	..	1.5.37	PW4	
Fury Four (2 SG, D, Pen)	..	8.5.37	PW11	
Beta Universal Four (SG, D, LF, Cl. B)	..	—	PW17	
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	..	6.1.34	PW24B	
Fury Four Super (SG, SG, D, Pen) Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	..	—	PW40	
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	..	26.9.38	PW67	
All-Wave "Corona" 4 (HF Pen, D, LF, Pow)	..	9.10.37	PW79	
"Aeme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B)	..	12.2.38	PW83	
The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC))	..	3.9.38	PW90	
<b>Mains Operated.</b>				
<b>Two-valve : Blueprints, 1s. each.</b>				
A.C. Twin (D (Pen), Pen)	..	—	PW18	
A.C. D.C. Two (SG, Pow)	..	—	PW31	
Selectone A.C. Radiogram Two (D, Pow)	..	—	PW13	
<b>Three-valve : Blueprints, 1s. each.</b>				
Double-Diode-Triode Three (HF Pen, DDT, Pen)	..	—	PW23	
D.C. Ace (SG, D, Pen)	..	—	PW25	
A.C. Three (SG, D, Pen)	..	—	PW29	
A.C. Leader (HF Pen, D, Pow)	..	7.1.39	PW35C	
D.C. Premier (HF Pen, D, Pen)	..	31.3.34	PW35B	
Ubique (HF Pen, D (Pen), Pen)	..	28.7.34	PW36A	
Armada Mains Three (HF Pen, D, Pen)	..	—	PW38	
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) "All-Wave" A.C. Three (D, 2 LF (RC))	..	—	PW54	
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	..	—	PW56	
Mains Record All-Wave 3 (HF Pen, D, Pen)	..	6.12.36	PW70	
All-World Ace (HF Pen, D, Pen)	..	28.8.37	PW80	
<b>Four-valve : Blueprints, 1s. each.</b>				
A.C. Fury Four (SG, SG, D, Pen)	..	—	PW20	
A.C. Fury Four Super (SG, SG, D, Pen)	..	—	PW34D	
A.C. Hall-Mark (HF Pen, D, Push-Pull)	..	24.7.37	PW45	
Universal Hall-Mark (HF Pen, D, Push-Pull)	..	9.2.35	PW47	
A.C. All-Wave Corona Four	..	6.11.37	PW81	

<b>Battery Sets : Blueprints, 1s. each.</b>				
£5 Superhet (Three-valve)	..	5.6.37	PW40	
F. J. Camm's 2-valve Superhet	..	13.7.35	PW52	
F. J. Camm's "Vitesse" All-Waver (5-valver)	..	27.2.37	PW75	
<b>Mains Sets : Blueprints, 1s. each.</b>				
A.C. £5 Superhet (Three-valve)	..	—	PW43	
D.C. £5 Superhet (Three-valve)	..	1.12.34	PW42	
Universal £5 Superhet (Three-valve)	..	—	PW44	
F. J. Camm's A.C. £4 Superhet 4	..	31.7.37	PW59	
F. J. Camm's Universal £4 Superhet 4	..	—	PW60	
"Qualitone" Universal Four	..	10.1.37	PW73	
<b>Four-valve : Double-sided Blueprint, 1s. 6d.</b>				
Push-Button 4, Battery Model	..	—	—	
Push-Button 4, A.C. Mains Model	..	22.10.33	PW95	
<b>SHORT-WAVE SETS.</b>				
<b>One-valve : Blueprint, 1s.</b>				
Simple S.W. One-valver	..	9.4.38	PW88	
<b>Two-valve : Blueprints, 1s. each.</b>				
Midget Short-wave Two (D, Pen)	..	—	PW38A	
The "Fleet" Short-wave Two (D (HF Pen), Pen)	..	27.8.38	PW91	
<b>Three-valve : Blueprints, 1s. each.</b>				
Experimenter's Short-wave Three (SG, D, Pow)	..	30.7.38	PW30A	
The Perfect 3 (D, 2 LF (RC and Trans))	..	7.8.37	PW63	
The Band-Spread S.W. Three (HF Pen, D (Pen), Pen)	..	1.10.38	PW68	
<b>PORTABLES.</b>				
<b>Three-valve : Blueprints, 1s. each.</b>				
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	..	—	PW65	
Parvo Flyweight Midget Portable (SG, D, Pen)	..	19.6.37	PW77	
<b>Four-valve : Blueprint, 1s.</b>				
"Imp" Portable 4 (D, LF, LF, Pen)	..	19.3.38	PW86	
<b>MISCELLANEOUS.</b>				
S.W. Converter-Adapter (1 valve)	..	—	PW48A	
<b>AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.</b>				
<b>Blueprints, 6d. each.</b>				
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1934 Crystal Set	..	—	AW444	
160-mile Crystal Set	..	—	AW450	
<b>STRAIGHT SETS. Battery Operated.</b>				
<b>One-valve : Blueprints, 1s. each.</b>				
B.B.C. Special One-valver	..	—	AW387	
<b>Two-valve : Blueprints, 1s. each.</b>				
Melody Ranger Two (D, Trans)	..	—	AW388	
Full-volume Two (SG det, Pen)	..	—	AW392	
Lucerne Minor (D, Pen)	..	—	AW426	
A Modern Two-valver	..	—	WM409	
<b>Three-valve : Blueprints, 1s. each.</b>				
Class B Three (D, Trans, Class B)	..	—	AW396	
Fan and Family Three (D, Trans, Class B)	..	25.11.33	AW410	
£5 5s. S.G.3 (SG, D, Trans)	..	2.12.38	AW412	
Lucerne Ranger (SG, D, Trans)	..	—	AW422	
£5 5s. Three: De Luxe Version (SG, D, Trans)	..	10.5.34	AW435	
Lucerne Straight Three (D, RC, Trans)	..	—	AW437	
Transportable Three (SG, D, Pen)	..	—	WM271	
Simple-Tune Three (SG, D, Pen)	..	June '33	WM327	
Economy-Pentode Three (SG, D, Pen)	..	Oct. '33	WM337	
"W.M." 1931 Standard Three (SG, D, Pen)	..	—	WM351	
£3 3s. Three (SG, D, Trans)	..	Mar. '34	WM354	
1935 £6 6s. Battery Three (SG, D, Pen)	..	—	WM371	
P.T.P. Three (Pen, D, Pen)	..	—	WM389	
Certainty Three (SG, D, Pen)	..	—	WM393	
Minute Three (SG, D, Trans)	..	Oct. '35	WM396	
All-Wave Winning Three (SG, D, Pen)	..	—	WM400	
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2HF Four (2 SG, D, Pen)	..	—	AW421	
Self-contained Four (SG, D, LF, Class B)	..	Aug. '33	WM331	
Lucerne Straight Four (SG, D, LF, Trans)	..	—	WM350	
£5 5s. Battery Four (HF, D, 2 LF)	..	Feb. '35	WM381	
The H.K. Four (SG, SG, D, Pen)	..	Mar. '35	WM384	
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	..	Apr. '36	WM401	
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Class B Quadradyne (2 SG, D, LF, Class B)	..	—	WM344	
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"Varsity Four	..	Oct. '35	WM395
The Request All-Waver	..	June '36	WM407
1935 Super Five Battery (Superhet)	..	—	WM379
<b>Mains Sets : Blueprints, 1s. 6d. each.</b>			
Heptode Super Three A.C.	..	May '31	WM359
"W.M." Radiogram Super A.C.	..	—	WM366

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Family Portable (HF, D, RC, Trans)	..	—	AW447
Two H.F. Portable (2 SG, D, QP21)	..	—	WM363
Tyers Portable (SG, D, 2 Trans)	..	—	WM367

<b>SHORT-WAVE SETS—Battery Operated.</b>			
<b>One-valve : Blueprints, 1s. each.</b>			
S.W. One-valver for America	..	15.10.33	AW429
Rome Short-waver	..	—	AW452
<b>Two-valve : Blueprints, 1s. each.</b>			
Ultra-short Battery Two (SG det, Pen)	..	Feb. '30	WM402
Home-made Coll Two (D, Pen)	..	—	AW440
<b>Three-valve : Blueprints, 1s. each.</b>			
World-ranger Short-wave 3 (D, RC, Trans)	..	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	..	30.6.34	AW433
Experimenter's Short-waver (SG, D, Pen)	..	Jan. 19, '35	AW403
The Carrier Short-waver (SG, D, P)	..	July '35	WM390
<b>Four-valve : Blueprints, 1s. 6d. each.</b>			
A.W. Short-wave World-Beater (HF Pen, D, RC, Trans)	..	—	AW436
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Two-valve Mains Short-waver (D, Pen) A.C.	..	—	AW453
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Enigrator (SG, D, Pen) A.C.	..	—	WM352
<b>Four-valve : Blueprint, 1s. 6d.</b>			
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	..	Aug. '35	WM391

<b>MISCELLANEOUS.</b>			
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Listener's 5-watt A.C. Amplifier (1/6)	..	—	WM387
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Harris Electrogram, battery amplifier (1/-)	..	—	WM399
De Luxe Concert A.C. Electrogram (1/-)	..	Mar. '36	WM403
New Style Short-wave Adapter (1/-)	..	—	WM388
Trickle Charger (6d.)	..	Jan. 5, '35	AW462
Short-wave Adapter (1/-)	..	—	AW456
Superhet Converter (1/-)	..	—	AW457
B.L.D.L.C. Short-wave Converter (1/-)	..	May '36	WM405
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The W.M. A.C. Short-wave Converter (1/-)	..	—	WM408

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Will match any modulator to any R.F. load. 50 watts, 17/6; 150 watts, 29/6; 300 watts, 49/6.  
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5 3/4 inches

# FOUR-BAND 3-VALVE S.W. RECEIVER

See Page 307

# Practical and Amateur Wireless

**3<sup>D</sup>**  
EVERY WEDNESDAY

Edited by F.J. CAMM

a GEORGE NEWNES Publication

Vol. 14. No. 351.  
June 10th, 1939.

AND PRACTICAL TELEVISION

A MIDGET  
2-Valve



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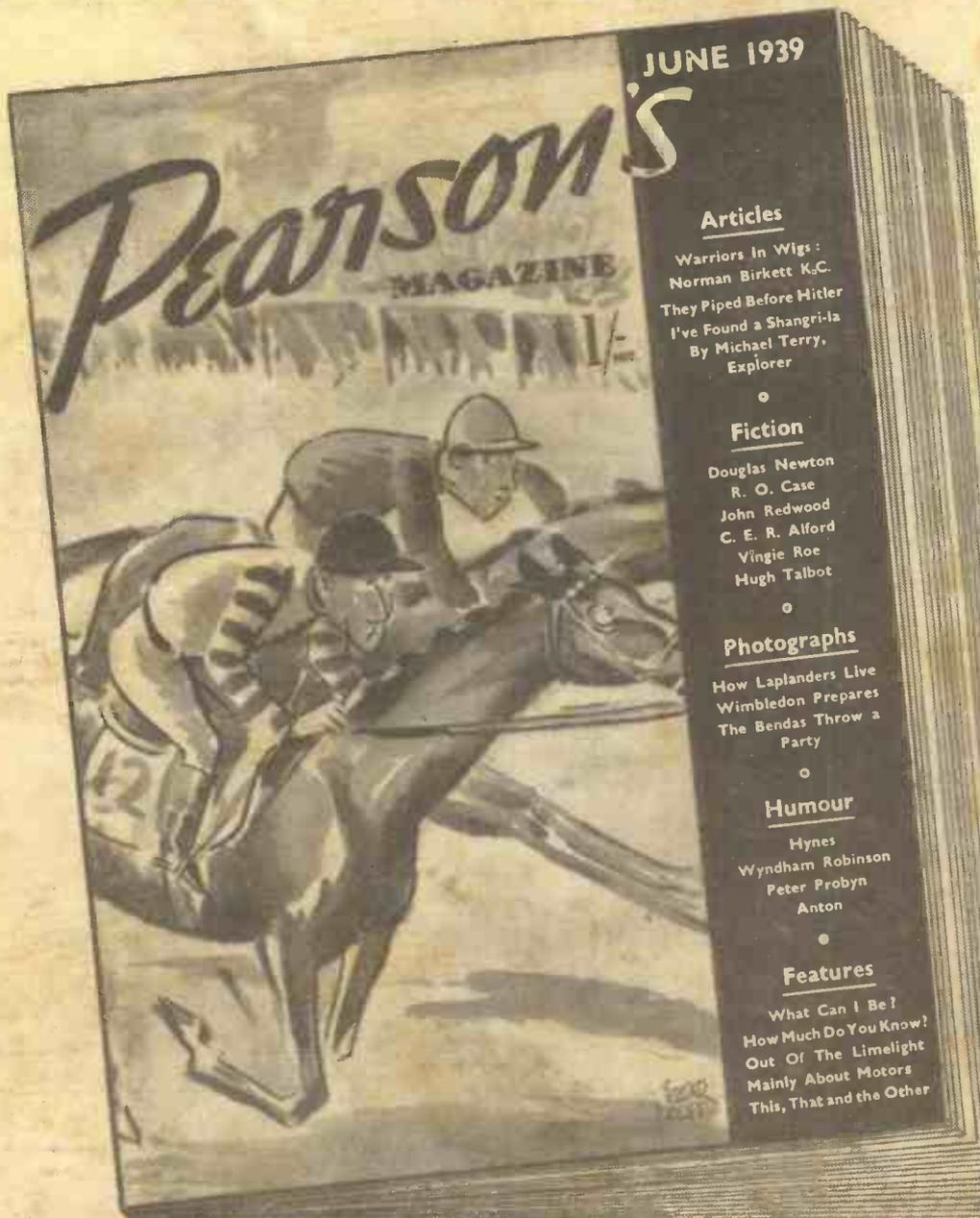
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Mr. Benda, famous for his amazing masks, invites his friends to a dance, where each wears one of the most valuable masks in the world. A photographic feature.

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# RECEIVER TESTING FALLACIES—See Page 297



## Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:  
W. J. Delaney, H. J. Barton Chapple, Wh.Sch., B.Sc., A.M.I.E.E., Frank Preston.

Vol. XIV. No. 351. June 10th, 1939.

# ROUND *the* WORLD of WIRELESS

### Amplifiers

WE have published several interesting amplifying designs during recent months, and in this issue give yet another design which, although built primarily for the Stand-by Crystal set recently described, will find many other applications. Small amplifiers are always useful and many experiments are often postponed or abandoned simply because no small amplifier is readily to hand. For increasing the output of a microphone for use with a large amplifier; for pick-up tests; room-to-room communication systems, and many other experimental purposes, a neat amplifier which is at once available will be found of the greatest value. Although built into a very small box, the amplifier utilises two transformers, and there is quite a substantial gain with the components and valves which are used. Modifications may suggest themselves to the keen experimenter, and we feel sure that the unit will prove of great value to every reader.

A.R.C.M., R.M.S.M., who was formerly bandmaster of the 2nd Seaforth Highlanders.

### Stagshaw Searchlight's Twenty-fifth Edition

E. S. WILLIAMS will present the twenty-fifth number of "Stagshaw Searchlight" on Saturday evening, June 17th. Since the Stagshaw transmitter opened in the autumn of 1937, the "Searchlight" has been spotting interesting people and odd happenings in the north-east, and has gained a large following among listeners not only in Northumberland and Durham, but in all parts of the North Region.

### Radio Pictures

A NEW system of picture transmission was recently introduced between Canada, New York and London. An 8½in. by 4½in. picture can now be fully transmitted in less than eight minutes, and the recently published pictures of the King and Queen's visit to Canada were transmitted on this new system.

### Car Radio Ban

IN Calcutta a regulation has been introduced banning the use of radio and gramophone reproducers in cars passing through or travelling in the city.

### World Convention

IT is now announced that the World Radio Convention, which was held at Sydney from April 4th to 14th (1938) cost just over £6,300. Of this sum, £2,500 was granted by the N.S.W. Government, about £100 was provided by the Institution of Radio Engineers and the remainder by contributions.

### Opening of Start Point and Clevedon

START POINT and Clevedon transmitters will be opened by the Duke of Somerset on June 14th, and these stations will radiate the Western programme on and after that date.

### Operas from Covent Garden

CONTINUING the broadcasts from Covent Garden, Acts 2 (Regional) and 3 (National) of "Siegfried" on June 12th, and Acts 2 (Regional), 3 and 4 (National) of "Aida" on June 15th, will be broadcast under the direction of Sir Thomas Beecham, Bart. Siegfried will be sung by Lauritz Melchior, Brünnhilde by Anni Konetzni and Wotan by Herbert Janssen. Aida will be sung by Maria Caniglia, Amneris by Ebe Stignani and Radames by Gigli.

### Coarse Fishing Opens

T. A. WATERHOUSE, one of the best-known practitioners of the art of coarse-fishing, and also one of the best-known writers and broadcasters on the subject, will give a talk on the opening of the season on June 15th. He has been Chairman of the Severn Board of Conservators for several years.

### Junior T.T. Race

MONDAY, June 12th, starts "T.T. Week" in the Isle of Man, and also a big week of Manx broadcasting, which will include not only accounts of and commentaries on T.T. events but entertainment broadcasts from the island. Early on the Monday evening, day of the Junior T.T. Race, Graham Walker will broadcast an eye-witness account of this, the first of the three big international motor-cycling events of the week. Walker, who will be speaking from the grandstand at Douglas, is an expert at his job, with a knack of passing on his enthusiasm and knowledge to listeners.

### Works Band's Seaside Tour

THE R.A. Lister Military Band starts next week on its summer programme. During the season it is to appear in Worthing, Bath, Cheltenham, Broadstairs and Hastings.

The band is drawn from the employees of Messrs. R. A. Lister and Co., Ltd., of Dursley, Glos., and every member is an ex-Army musician, most of whom were soloists in their regimental bands and are now on the reserve.

The bandmaster is Mr. S. T. Webber,

### Television Protests

THE Postmaster-General recently received a deputation from the cinema industry opposing the extension of television in cinemas. They desire to restrict television development to home use, and the Kinematograph Renters' Society and Cinematograph Exhibitors' Association propose to urge the P.M.G. to arrange that the B.B.C. transmissions shall not be broadcast to cinemas.

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# ROUND the WORLD of WIRELESS (Continued)

## Extension of Yugoslav Radio Network

ACCORDING to plans published by the Yugoslav Ministry of Posts and Telegraphs at Belgrade, steps are to be taken immediately to increase both the number and power of the existing broadcasting transmitters. The Skoplje station on which work is almost completed is to be endowed with a power of 100 kilowatts, as against 20 kilowatts for which it was originally designed. Other transmitters are to be erected at Split (Spalato), Serajevo, and Maribor.

## Scrubbing by Order

AT Mukden (Manchukuo) the inhabitants are roused daily by means of strident sirens at 6.30 a.m. in order that they may not fail to listen to the radio broadcast of physical exercises. Following this course of gymnastics they are compelled to clean up their houses according to instructions given to them by the studio announcer. The streets have to be swept in front of the houses, and the roadway watered to allay dust. Every morning after the broadcast police patrols carry out an inspection to make sure that the radioed orders have been complied with.

## Canada's New Radio Law

A LAW has now been promulgated to the effect that no new privately-owned broadcasting station in the Dominion of Canada shall be allowed to erect a transmitter exceeding a power of one kilowatt. On the other hand, the programme laid down by the Canadian Broadcasting Corporation is being completed as quickly as possible. Two 50-kilowatt transmitters, namely, CBL, Ontario, and CBF, Quebec, were opened in 1937; another station of the same power, CBA (Maritime Provinces), was formerly launched on the ether on April 8th last, and CBK (Prairies) is now ready to work. The power of CBR (British Columbia) has been increased to 5 kilowatts, and it is hoped to install in the near future five more stations in the provinces of Ontario and Quebec. A scheme has now been drawn up for the establishment of a regular short-wave service with a programme of interest to Canadians abroad.

## Soviet's Proposed New Radio Headquarters

FOR some years the U.S.S.R. (Soviet Union) has considered the construction of a "Broadcasting House" at Moscow which will surpass in size and luxury that of any other existing in any European state. The building, as planned, will be more than 300 feet in height, and will contain seating accommodation in one auditorium for six thousand spectators and listeners. In addition, it will provide a number of studios of various sizes to meet the requirements of the daily broadcast programmes.

## INTERESTING and TOPICAL NEWS and NOTES

### Poste du Grand Serail

THE *Compagnie Française Radio-Orient* has installed a small broadcasting station, *Radio Levant*, at Beyrouth (Syria); it works on 288.6 m. (1,046 kc/s). It is not



Gigli, the world-famous tenor, paid a surprise visit to H.M.V.'s new West-End showrooms in Oxford-Street, recently. During his tour of the building, Gigli made a record in the recording studio, and is here seen at the microphone.

in any way subsidised by the French authorities, but is purely a private concern. Broadcasts are made daily in French and Arabic, and arrangements are being concluded with the Universities of Beyrouth and Damascus to provide lecturers in the studio.

### Facsimile Tests for Air Corps

THE value of facsimile broadcasting as an aid to the Army, Navy and Air Corps in time of war was observed recently, when the American station WLW made its first broadcast in collaboration with the United States Air Corps. The test, consisting of five fictitious field messages and maps, was prepared by Lieutenant Colonel Hugh Mitchell, signal corps director at the aircraft radio laboratory, Wright Field, Dayton, Ohio. One was a pencil-written field message, two were general maps, and two were specific maps showing the location of imaginary objectives and moving troops. The special programme broadcast on the regular early-morning facsimile transmission over WLW at 2.15 a.m. E.S.T., was picked up with excellent results by several of the Readco facsimile receivers installed at various locations by Crosley engineers.

## Extended Service to Latin-America

THE B.B.C. inform us that an extended service of broadcast programmes for the benefit of listeners in Latin-America will start on Monday, July 3rd. These programmes will begin at 11.25 p.m. and end at 2.20 a.m., Greenwich Mean Time, approximately, each day. They will be specially designed to satisfy the tastes of Latin-American listeners and will be announced in Spanish and Portuguese.

The news bulletins in Spanish will be broadcast at 11.30 p.m. and 2 a.m., G.M.T. daily, and a Portuguese bulletin will be broadcast at midnight.

The programmes will also include talks in Spanish and Portuguese, as well as music and general entertainment. They will be radiated on GSO in the 19-metre band and GSC in the 31-metre band, by one or other of which the whole of South and Central America is expected to be covered.

In March, 1938, the B.B.C. began a service of daily news bulletins in Spanish and Portuguese, and it has been found that these are widely appreciated by Latin-American listeners. Details of the opening programmes will be announced as soon as these have been arranged.

## Spring Chicken!

OVER a dish of fried spring chicken last week, Ruth de Vore, of WLW's "Moon River" trio, recalled an embarrassing story with a happy ending. Eating in a swanky Gold Coast dining-room several years ago with specially prominent Chicago friends, Ruth applied knife and fork to a fried half chicken, only to have the object of her appetite do a loop-the-loop on to the floor several feet away. The quick-thinking singer saved the day by calling the butler and loudly reproaching him, "Next time you serve me fried chicken, be sure you kill the thing first!"

# SOLVE THIS!

## PROBLEM No. 351

Burton built a three-valve receiver using variable-mu H.F. detector and pentode stages. When tested he found that tuning was erratic and accordingly started making tests. He connected 'phones in series with a battery and when testing the two-gang condenser obtained a reading across fixed and moving vanes of one section, but not of the other, and accordingly decided that one section was short-circuited. He removed the condenser, but could find nothing wrong. Was his test in order, and what did it indicate? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 351 in the top-left hand corner and must be posted to reach this office not later than the first post on Monday, June 12th, 1939.

## Solution to Problem No. 350

When Bentley added a further pentode the additional current reduced the H.T. applied to previous valves and thus it did not overcome his trouble. A larger rectifier section would have been needed to enable the push-pull stage to be used.

The following three readers successfully solved Problem No. 349 and books have accordingly been forwarded to them: D. Abelson, 18, Hillcrest Avenue, Edgware, Middlesex; E. Knight-Clarke, 19, Countessbury Avenue, Bush Hill Park, Enfield; J. Robertson, Aukengill, Wick, Caithness, Scotland.

# THE "MIDGET" TWO-VALVE AMPLIFIER

L. O. Sparks Gives the Complete Constructional Details of a Very Compact Two-valve Battery Operated Amplifier in This Article, and Mentions its Many Applications

A FEW years ago an amplifier having even a modest output was invariably a bulky piece of apparatus and was usually associated only with radio receivers. In fact, it was quite common to have, say, an H.F. and Det. unit in one cabinet or section and a one or two-stage amplifier in another.

The idea is quite sound, but in the days I have in mind, terminal strips and dozens of connecting wires seemed to be the fashion, consequently the completed installation used to assume a most complicated appearance guaranteed to scare off all but those who had earned or adopted the title of experts!

Progress has brought us highly efficient valves, miniature components—without sacrificing efficiency—and a better understanding of high and low-frequency amplification which, in turn, has enabled apparatus to be designed along more compact and economical lines.

Even to-day, however, in spite of these additional facilities there are still many amateurs who have a strong desire to make any form of amplifier look like a small edition of a control panel in a broadcasting station. Such ideas are, I suppose, good for component manufacturers and at least satisfy individual desires, but, unfortunately, they have a nasty knack of frightening the less, shall we say, ambitious constructor or listener who has a genuine need for some simple means of increasing the volume obtained

The theoretical circuit of the amplifier. Use it to check your wiring.

from an existing piece of apparatus.

The limits of L.F. amplification and the possibility of obtaining considerable power from battery operated amplifiers has been dealt with in past issues, so we will rule out the question of attempting to compete with even a modest mains-operated amplifier so far as output is concerned.

The next point to be settled, then, is what power is required, and will a battery amplifier satisfy the requirements?

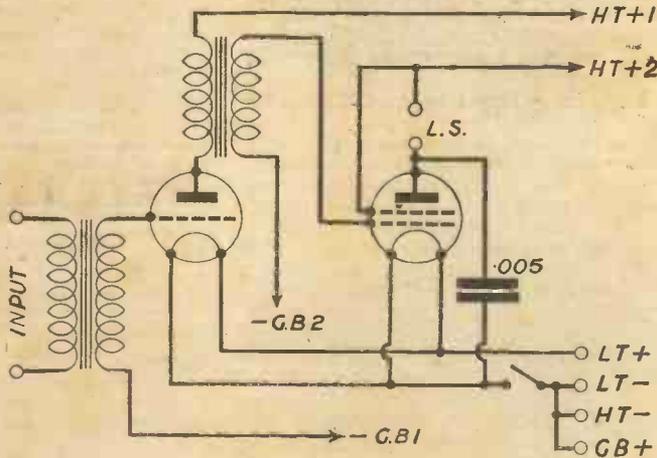
These questions I cannot answer as they are governed by individual conditions, but it is hoped that the suggestions given below will enable a satisfactory solution to be reached.

For example, with the amplifier about to be described a loudspeaker could be used when it is coupled to an efficient crystal set. With a one-valver, headphones could be laid to one side and a loudspeaker

substituted. If coupled to a two-valver, more volume than that normally required for domestic amusement will be obtained, and with a three-valver, well, I would not advise such applications, as overloading of the valves would undoubtedly take place.

So much for the radio side. There are, however, other uses for a small amplifier of this type as described below.

When certain types of microphones are being used, a pre- or head amplifier is often required to boost up the microphone output before it reaches the main amplifier. In such circumstances the Midget would prove a very handy little unit, though, of course, if it was going to be used continually for such work, simple modifications could be made to make it even more suitable. For inter-room communication, microphone testing, pick-up reproduction or for one of those installations which we are often asked about, namely, the placing of a microphone near baby's cot so that his or her crooning can be heard via a speaker by those in another room, the amplifier will prove most useful.

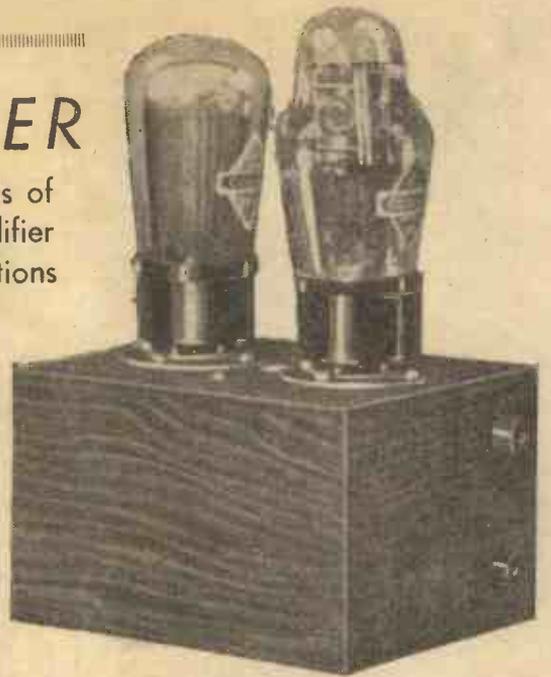


### The Design

The design is straightforward and simple. It must be remembered that it is not intended to be a high-fidelity or a miniature P.A. job with every refinement, but it is capable of giving very satisfactory results when worked within its limits and under reasonable conditions.

It has been made compact so that it will lend itself more readily to the many applications mentioned above and, incidentally, keep its cost well within the more general requirements.

The circuit can be seen in Fig. 1. Many may wonder why two L.F. transformers are used as in certain instances this might seem unnecessary. The one on the input



This is how the completed unit will look if instructions are followed carefully.

side has been embodied so that the unit is rendered more universal. For example, the two input sockets can be connected directly to the 'phone terminals of a crystal or valve receiver, provided, in the case of a receiver using two valves, that the existing output valve in the receiver is replaced by an ordinary triode of the H.F. or L.F. type.

This precaution is necessary as the primary winding of the transformer has certain current limitations.

The secondary of the input transformer is connected across the grid circuit of the first valve, a triode of the H.L. class, which, in this case, is the Cossor 210HL.

The anode of this valve receives its high-tension through the primary winding of the second transformer, and it should be noted that a separate H.T. lead is provided for this section to allow the voltage to be adjusted to the lowest value consistent with satisfactory operation.

The signal from this transformer is fed into the grid of the output pentode which is of the latest economy type, namely, the Cossor 220HPT. This particular valve was selected because it possesses the added advantages of being very economical as regards high-tension current consumption, besides having a good amplification factor and being capable of giving quite a reasonable output.

### Construction

The illustrations give all the essential details quite clearly, and no trouble should be experienced with the assembly of the components or their wiring. One or two tips, however, will not be amiss, as there are always two ways of doing anything and the easiest is not always the quickest.

The same wooden case as that used for the Stand-by Crystal Set (May 13th issue) is used, as it is both cheap and serviceable. This, it will be remembered, is supplied with a plain white wood finish, so it can be stained or coloured to suit individual taste.

All holes should be drilled first and their edges smoothed off with fine sandpaper.

(Continued overleaf)

**THE "MIDGET" TWO-VALVE AMPLIFIER**

(Continued from previous page)

The valveholders and sockets can then be mounted, although if the specified case is used it is supplied with the four sockets already fitted.

Next, complete the wiring of the filament circuit, not forgetting the switch in the negative L.T. lead. Fit the two flexible leads for the L.T. supply, and note that the H.T. negative, L.T. negative and the G.B. positive connections are made common outside the amplifier. The illustration, Fig. 2, makes this clear. Before fixing the input transformer in position, connect its green lead, after reducing it to a suitable length, to the grid pin of the four-pin valveholder and join the grey and yellow leads to the two input sockets. Now fasten the grey lead from the second transformer to the anode pin of the same valveholder.

When these connections are made, the transformers can be bolted into the positions shown, and their other connections made. A word of warning might be necessary here. Be careful with the fine flexible leads when cutting and baring them. Don't subject them to violent jerks or their connection to the transformers might be damaged.

The anode-pin of the five-pin valveholder can now be connected to the black output socket, together with one end of the .005 mfd. fixed condenser, the other end of which is taken to the negative L.T. pin of the valveholder.

To the red leads on each of the transformers, and to the yellow lead of the second transformer, connect suitable lengths of flexible wire for the G.B. and H.T.

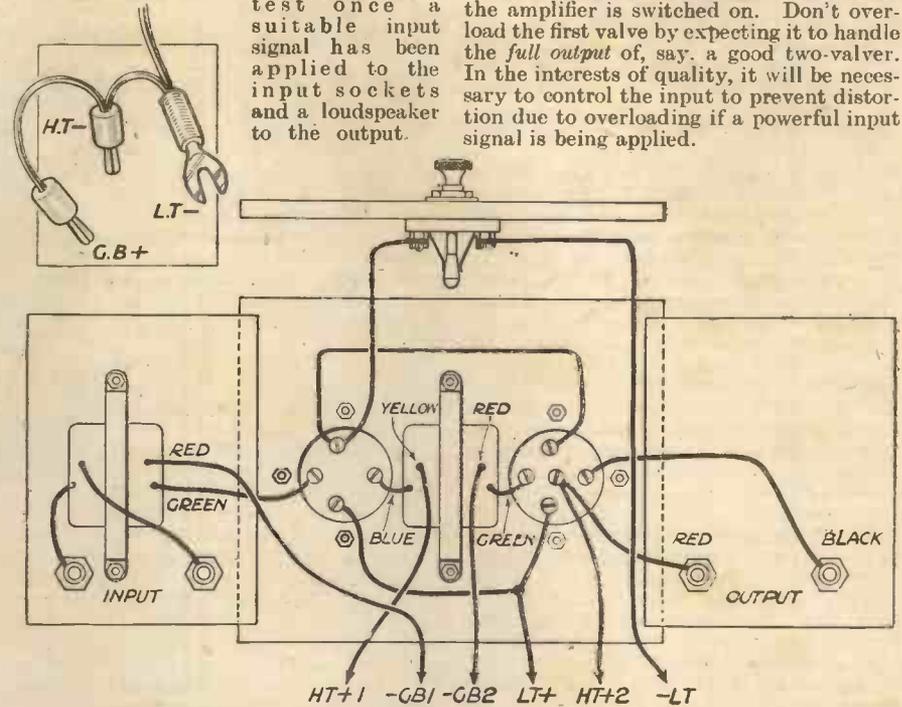
connections respectively. The second H.T. lead, i.e., H.T.+2, is taken to the red output socket and to the centre pin of the five-pin valveholder.

After checking all wiring and connections and inserting valves and connecting batteries, the unit is now ready for test once a suitable input signal has been applied to the input sockets and a loudspeaker to the output.

**Operating Notes**

Keep the H.T. on H.T.+1 as low as satisfactory results permit. Apply 1½ volts negative bias to G.B.1 and 4½ volts to G.B.2. These figures being for 60-80 volts on H.T.1 and 120 volts H.T. on H.T.2.

Never remove the bias connections when the amplifier is switched on. Don't overload the first valve by expecting it to handle the full output of, say, a good two-valver. In the interests of quality, it will be necessary to control the input to prevent distortion due to overloading if a powerful input signal is being applied.



Layout and wiring of all components. Pay attention to transformer connections.

**PROGRAMME NOTES**

**"When Day is Done"**

THE series called "When Day is Done" is widening its scope yet again. This series of light musical programmes of soothing melodies at the end of the day has been broadcast in the Welsh programme, and has also been heard on the main Regional wavelength. On June 7th, Scotland and Northern Ireland will also listen to "When Day is Done." Those taking part will be the same team as before: Betty Hewitt, Mai Jones, Haydn Adams, Lyn Joshua, Cliff Earnshaw, the B.B.C. Welsh Septet, directed by Frank Thomas, and the Male Chorus, who will sing arrangements by Idloes Owen. The programme, which has been devised by Mai Jones, will be produced by Glyn Jones.

**What the Seaside Thinks of You**

THE tables will be turned on June 7th, when listeners, instead of hearing what people think of the seaside, will be told what the seaside thinks of them. What do seaside landladies, life savers, beach photographers, guides and all the others who look after visitors on holiday really think of them? Elwyn Evans will be going to some of the seaside resorts of North Wales to try to find out, and he will bring to a studio in Bangor on June 7th some of the people whom he has interviewed.

**"Sing Song"**

ROCHDALE, home-town of Gracie Fields, seem to make a habit of producing first-rate variety artists. Arthur White, for example, is such a popular stage personality in Lancashire that he seldom gets the opportunity to entertain audiences much farther afield. He will do so, however,

on June 26th, when, on the National wavelength, he broadcasts for the first time in the B.B.C.'s "Sing Song" programme.

Before turning to the stage—as comedian and manager of his own shows—he had a varied career as newspaper seller, "doffer," pig driver, mill hand, miner, navvy, and traveller.

With him in Ernest Longstaffe's cast for the "Sing Song" programme will be Hazell and Day, Regan and Ann, Foster Richardson, Jimmie Elliott, the animal imitator, and two new microphone personalities, Frank O'Brian and Joe Hudson, as "Mr. Twerp and Mr. Twerpington"—two commercial travellers.

**Week-end Escape by Canoe**

THE talks series entitled "Week-end Escape" brings to the microphone on June 8th a speaker who advocates, as the ideal way of spending an out-of-doors week-end that is different, the taking of a canoe trip. Alastair M. Dunnett, who is to give this talk, is a young man who made news some years ago by the canoeing trips which he essayed with a companion through the Scottish firds and out to the Western Isles. He will speak about the convenience of this hobby and the opportunities which exist for it in Scotland. He has walked and climbed all over the country, covering much of the ground between the Borders and the North coast at one time or another, and in the Outer Isles. Another hobby of his is sailing round the coast in cargo vessels and herring drifters, but it is as canoeist that he is most widely known.

**"Living With My Job"**

THE next talk in the series entitled "Living With My Job," to be broadcast on June 8th, will be of particular interest to women listeners. Two profes-

LIST OF COMPONENTS		
	£	s. d.
Valveholders—Clix:		
1 4-pin with terminals (V1), chassis mounting	0	0 8
1 5-pin with terminals (V1), chassis mounting	0	0 9
Valves—Cossor:		
1 210 H.L.	0	4 9
1 220 H.P.T.	0	9 0
Transformers—Bulgin:		
2 Type L.F.58 (4s. 3d. each)	0	8 6
Fixed Condenser—Bulgin		
1 .005 mfd., type P.C.205	0	0 6
Switch—Bulgin:		
1 On-off type S38	0	0 10½
Case—T. W. Thompson:		
1 Wooden case fitted with plugs and sockets	0	2 0
	£1	7 0½
Plus wire, sleeving, plugs and spade connectors.		

sional women—a Civil Servant and a journalist—following as widely different careers as it would be possible to find, will take part. The Civil Servant will discuss her fixed hours and holidays—the journalist her lack of them. Questions of salary, status with men colleagues, pensions, chances of promotion, prospects of marriage will show wide variations when discussed by these two women workers. But they will agree that they have this in common, both have to learn to keep valuable secrets as part of their job. To the question, "Can women keep a secret?" they will reply, "We have to, if we want to keep our jobs." Each speaker will tell what is her attitude to life outside her work, and how she reconciles the claims of a busy and exacting professional career with her interests as a woman. They will also discuss how far a professional woman who is not married can have "domesticated" interests—and why they both like gardening. A man will "referee" the discussion.

# A FREQUENCY RECORDER

A GRAPHICAL recorder is a most desirable piece of apparatus for the experimenter, but is, unfortunately, expensive. There is, however, ample scope for the home constructor to evolve a practical arrangement which would not be prohibitive in cost to make up.

It is along these lines that the writer set about the construction of a moving-coil and rotary drum movement as depicted in the illustrations, the view being to obtain first of all, sufficient sensitivity to record the essential characteristics to distinguish various forms of input, any measurable degrees of accuracy being a secondary consideration but of obvious benefit.

## Rotary and Push-pull Operation

Using the push-pull and rotary drum principle proved quite a simple, but very interesting, way of obtaining continuous graphing with a stationary ink, and reference to Fig. 1 will show how this method has been adapted.

A fractional horse-power electric motor is employed, having an incorporated gear reduction providing approximately 47 r.p.m., and this motor is coupled to the recording drum shaft through two 6:1 epicyclic reduction drives, bringing the (off load) r.p.m. down to 1.3.

To combine the rotary and push-pull functions, it was necessary to introduce a flexible coupling which, whilst not impeding the shaft drive, offered as little mechanical resistance to the moving-coil action as possible.

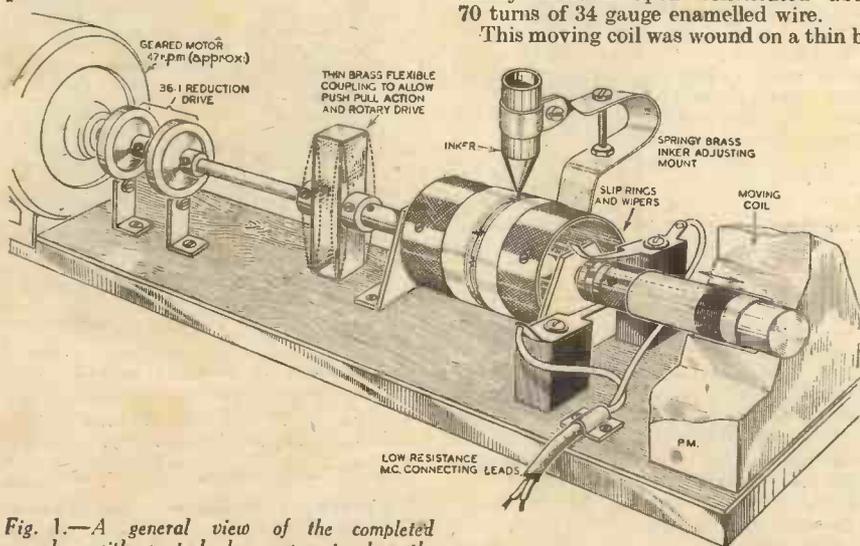


Fig. 1.—A general view of the completed recorder, with part broken away to show the moving coil.

In this respect, a number of spring brass strips were fashioned into various types of coupling, adjustment being made both in the gauge and length of the strips, the ultimate scheme being as illustrated in Fig. 1.

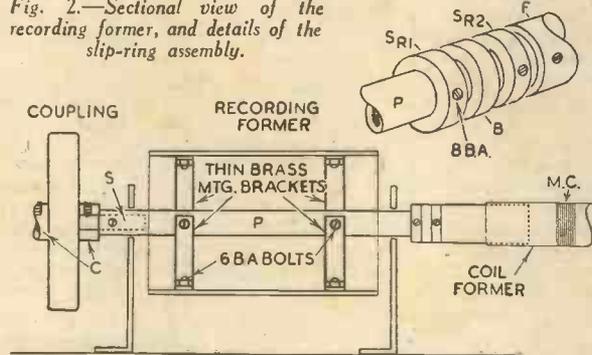
In designing the moving coil it was found that there was no hard and fast rule to follow to get distinguishable registering, the only imperative conditions being the absolutely free movement, using as low a resistance winding as possible consistent with the characteristics of the output transformer secondary, in the small hook-up amplifier with which this recorder is constantly used.

## Constructional Details of a Novel and Useful Unit for the Experimenter

### Coil Windings

A D.C. load maintained for about half a minute, proved the simplest method of determining the different flux densities of

Fig. 2.—Sectional view of the recording former, and details of the slip-ring assembly.



the three types of windings tried out with extremes in wire gauge and turns, the slight but perceptible limits of the graph peak in relation to the tracking lines (see Fig. 3, "T") serving as a guide. The winding finally decided upon constituted about 70 turns of 34 gauge enamelled wire.

This moving coil was wound on a thin but

in this shaft. The driving shaft fits snugly into the moving-coil former shaft "F," and is secured by two 8 B.A. screws, one of which is shown in the inset.

### Assembling the Parts

After mounting the motor and drum assembly on the long baseboard, allowing sufficient space between the drum brackets and the edge of the drum for the push-pull movement, also enough space between the slip-ring former and the adjacent bracket, the moving-coil assembly was finished off by gluing the inside surface, and sliding the coil former on to the slip-ring former.

Having left long ends after winding the coil, these were recessed in grooves made in the ebonite rod and paper former, terminating them at the slip rings by neatly soldering, the grooves then being filled with wax, and scraped flush with a penknife. When the moving-coil former had thoroughly adhered to the ebonite, the permanent magnet (P.M.) was positioned, and the push-pull movement tested.

When satisfied on this point, two wiper contacts were made from a small sheet of phosphor bronze which was handy, the width of each wiper being so arranged that at the extremities of the moving-coil movement, the contact was maintained, and without the possibility of a short circuit either way.

It will be seen from Fig. 2 that the drum assembly comprises a thin paxolin former of conventional type, this being fastened to the driving shaft "P" by four light gauge brass angle strips and 6 B.A. screws, as depicted.

Each screw passes through clearance holes in both the brackets and the shaft, being finally locked with nuts.

Aluminium brackets were provided for bearing the drum, no other form of incidental shaft bearing being found necessary for smooth rotation.

### Inker Details

The inker used in the model described was devised by cutting down an old stylo pen, and mounting this on an adjustable mount as illustrated in Fig. 1.

Indian ink is not recommended, this having a tendency to clog the fine outlet, thus necessitating persistent cleaning which requires the frequent dismantling of the inker, and this is not desirable when the right pressure and position is once obtained

(Continued on page 303)

strong paper former made up from some "Ivory" type note-paper, and glued between wrappings, finally fixing the winding by painting with an amyl acetate solution.

A discarded speaker provided the permanent magnet, the pole piece being carefully aligned with the rotary shaft, slot fixing holes which were provided in the unit mounting baseboard providing a means for final adjustment on completion of the whole assembly.

An ebonite rod and copper tube were cut to furnish the slip ring assembly detailed in Fig. 2, the slip rings SR1 and SR2 being spaced by an ebonite ring of equal dimensions "B." No. 8 B.A. countersunk screws secure the rings to the driving shaft "P," these screwing into tapped holes provided

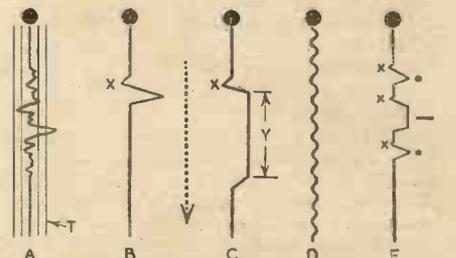


Fig. 3.—Examples of tracking lines traced by the recorder.

# PLAN YOUR LAYOUT

How the Construction of a Set may be Simplified, and Efficiency Increased  
by Systematic Working to a Plan. By W. J. DELANEY

WHEN a house or factory is to be built, the first thing which is done is to have a set of working drawings prepared by a draughtsman or architect. Factory-built wireless receivers are also built on similar lines, although in this case it may be thought that it is essential owing to the fact that reproductions of an original model are required. Many constructors fail to realise that the work of construction may be simplified, and in many cases the efficiency of the finished receiver improved, if a set of working drawings are first prepared. In far too many cases a constructor merely looks up a circuit which he thinks will suit him, looks out spare parts which may be used in the circuit, and then picks any chassis which may be available and proceeds to build up the set in what he thinks is the best way. Consequently, when wiring is commenced, all sorts of snags are likely to arise, and in many cases it may be necessary to remove certain components and place them in alternative positions. Of course, when building from a published blueprint or constructional data such points will not arise, but let us see just what kind of snags may be avoided, by a planned layout, and the best method of setting about it.

## Suitable Components

Having decided upon a circuit, the first procedure is to obtain suitable parts, and here such problems as current carrying capacity and similar electrical features will be the main points to attend to, rather than physical characteristics. All components should be got together first, and then the type of chassis or baseboard may be considered. The coils and tuning condenser will be the main governing features as these will have to be placed in definite positions, according to the connecting points on them, and in turn they will control the positions of the valves to which they are connected. The best plan is, therefore, to place these components on a table or work-bench in the positions they will eventually have to occupy and then to arrange the remaining components round them in suitable electrical positions. That is to say, transformers or similar components which may have a fairly extensive field which could give rise to interaction or hum difficulties, should be kept as far away as possible from similar components. As these parts are located it will be noted that space can be saved if certain components were placed one above the other, thus indicating the desirability of using a metal or metallised chassis. Remember in this connection that the chassis will act as a screen between components.

## Wiring Facilities

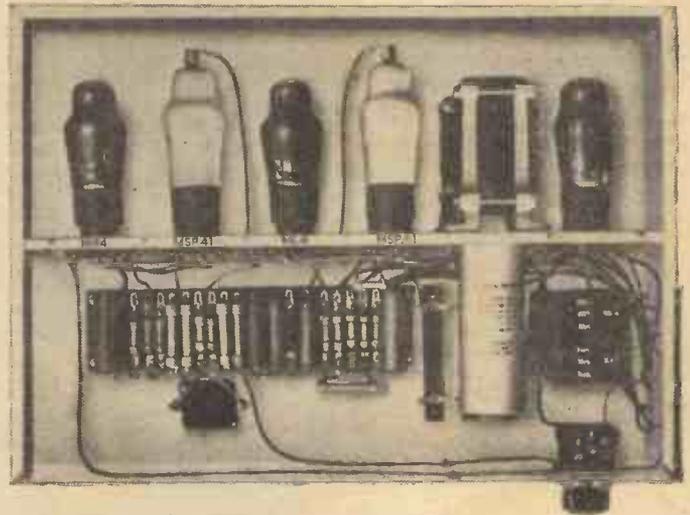
When placing components the run of wiring should also be considered, and it may be found that it will be impossible in some cases to shorten wiring without introducing coupling between certain components, and therefore a complete re-arrangement of the parts may be called for. On the other hand, a long lead in certain parts of the circuit may be of little

consequence, and thus a little thought is called for in this preliminary planning.

When a satisfactory scheme has apparently been evolved, the next best procedure is to obtain a piece of cardboard or paper of the size indicated for the chassis and to stand the parts on this, marking out the outlines with a pencil. With the theoretical diagram before you, you can then put in the wiring with your pencil, and it will soon be noted that certain points may be "commoned" or the use of earthing tags introduced. This in turn may show that a component may be moved slightly so that an earthing tag may be included on its holding-down bolt to shorten certain leads or to simplify the interconnection of certain parts of the circuit. Resistors and small fixed condensers will form part of the inter-connecting leads, and it should be considered whether or not it would be desirable to use a group-board so that these items may

Similarly, the presence of earthing tags will enable you to place these on as the components are bolted in position and will save unscrewing nuts and placing these on as the wiring is carried out. Thus, although it may take some little time to prepare these working drawings, there will eventually be a saving of time, and the wiring will be carried out much more expeditiously. This in turn will lead to greater efficiency, as the soldering-iron may be kept in use and the work of connecting up will not have to be interrupted from time to time to make changes in component fixing or other alterations. This, in turn, means that the work will be carried out much more efficiently and the final receiver will be much more likely to function satisfactorily.

We have not dealt in this article with the question of testing all components before they are incorporated, as the idea has been more to show that systematic



A good example of unorthodox layout which reduces wiring losses and simplifies connections and testing.

all be mounted rigidly before the board is attached to the panel, damage thereby being avoided and final wiring simplified. The introduction of the group-board may result in the necessity for shifting certain components and again introducing a new arrangement of the parts.

## Final Design

With a simple receiver it may not be necessary to make up a test layout before constructing the final model, but if you can spare the time it is a good plan to use a rough wooden chassis and to make rough connections in order to ascertain the suitability of the layout in practice. If this is found in order, or if you feel that such a try-out is not needed, you can, from your pencil diagram drill a chassis, and this diagram will enable you to make every hole required before assembling any of the parts. Often, if this procedure is not adopted you may find that after one or two parts have been placed in position a hole is needed for an inter-connecting lead or for some other purpose, and it may be difficult to get the drill into position for this purpose.

planning can greatly increase the interest of constructional work, and repay the constructor by providing him with a better article in the finished receiver.

EVERY PRACTICAL WIRELESS  
SERVICE MAN SHOULD HAVE

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SERVICE MANUAL**

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# ON YOUR WAVELENGTH



Don't Miss the Miss!

A COMPETITION is being organised in connection with Radiolympia which will certainly add to the interest of what I am certain will be the most interesting show of the whole series. The competition is to select the girl having the perfect radio and television personality, and she will appear at the Exhibition, which extends from August 23rd to September 2nd. The heats of the contest are being conducted at the leading seaside resorts, one night each week, commencing July 10th to August 14th. It is hoped that the competition will also help local concert parties and the trade of each town selected. The girl will be chosen for appearance, personality, and microphone voice. The contest will be publicised by means of posters, cards to hang in hotels, cafés, etc. whilst handbills, press advertising, and editorial publicity (such as the paragraph I am now writing) will lend aid. Prizes will be given by the R.M.A. for each heat, and the services of a compère will be available. The judging will be by means of volume of applause from the audience. In connection with it a theme song is being written by a well-known composer, and it is hoped to arrange a broadcast in connection with at least one of the heats, one semi-final, and the final. At the completion of the local heats, semi-finals will be held, in large centres of population such as London and Birmingham, to select 12 semi-finalists who will appear in London for final judging. The semi-finals and finals will be judged by radio critics, film, stage and radio stars, and other well-known personalities. Each semi-finalist will receive a prize of a radio set exceeding 12 guineas in value.

The prizes for the finals will include such benefits as broadcasting engagements, television appearances, contract to appear at a well-known London revue theatre, film test, a complete outfit of clothes by a well-known London modiste, etc., etc., and a cash prize of £5 will be presented to the concert party through whom the winner enters the competition.

In addition to the competition another plan of general interest is

By *Thermion*

open to co-operating concert parties. The R.M.A. will supply small coloured discs (red for men, blue for ladies) bearing the words "Let's all Go to the Radio Show," and having progressive numbers. These can be given away at every performance. The object is for each man to find the girl wearing the ticket bearing the same number as his own. Prizes will be provided by the R.M.A. for distribution each week to the winners. Further details from A. J. Dannhorn, 59, Russell Square, London, W.C.1.

### Wind Chargers

SUCH a welter of correspondence, since I published my paragraph about wind chargers. One reader has kindly forwarded practical details showing how he converted a 6-volt car dynamo for wind-charging purposes. In the meantime readers might like to know that Messrs. A. W. Gamage can supply a commercial product for £8 17s. 6d. It is of American manufacture and, I believe, very efficient.

### Mikes Dipped in Gold

THE microphones used by the King when he broadcast to his Empire from Canada on May 15th (there were four of them) were dipped in gold. They were of Western Electric manufacture, and go more of a different type, each surmounted by a gleaming crown of sterling silver, were placed at the King's disposal in the various cities. Extraordinary precautions were taken to ensure a faultless broadcast. Special supporting stands, equipped with special expanding tripod bases, provided firm mounting for each instrument. Also, 20 cardioid directional microphones were provided for use on occasions where crowd noise or other interference might have marred the King's broadcast.

### The "Baby-bull" Horn

LATEST product to be announced in the field of public address equipment is known as the "Baby-bull" horn—a powerful loudspeaker, made by the Western Electric Company, which is capable of radiating enjoyable music and high quality speech to an open air audience of thousands. Because of its unique electro-acoustic characteristics and weather-resistant construction the instrument is expected to find wide application as a sound re-enforcement device in baseball parks, exhibitions, county fairs, outdoor concerts, and similar public gatherings where large masses of listeners are scattered over a broad area.

In efficiency, the new speaker compares favourably with the finest units employed in talking motion-picture or high quality public-address work, and its frequency response is substantially uniform over a range extending from 110 to 6,500 cycles. When driven by a 50-watt amplifier it is capable of radiating approximately 17 watts of acoustical energy.

The "Baby-bull" speaker consists of a single metallic horn of exponential type which is driven by two dynamic receivers enclosed within a moisture-proof aluminium housing. This type of loudspeaker has directional characteristics which permit faithful reproduction throughout an angle of approximately 30 degrees. This quality helps to solve the public-address engineer's problem of distributing the sound to desired areas without creating a disturbance in adjacent locations. Permanent magnet fields eliminate the necessity for external excitation. The device is officially known as the 6030B horn. It weighs 65lbs. complete, measures 50in. overall in length and is 25in. wide at the bell.

### Radio Gramophones and Pick-up Terminals

PROPOS my query concerning pick-up terminals, I have received the following letter from E. J. O., of Wandsworth:

"Regarding your article on radio-gramophones, my opinion is that a pick-up plugged into or added on to a set, via terminals, would never be so efficient as one that is built in with

short rigid leads to a switch on the panel. I have had a heap of trouble on various made-up sets with plug-in pick-up sockets; even with screened leads the slightest vibration seems to upset the radio whilst you are tuned to a station. How many ways are there of connecting a pick-up? I have a friend's set here; he has made a radiogram cabinet and wants me to fix the grammo. part for him but I am afraid it has me guessing. It is a commercial type of superhet. I tried several ideas of fixing, then wrote to the makers for the circuit, but was informed that it was out of print. I wonder if any of your readers happen to have one to loan me, if so I would gladly repay the cost of posting on returning print, and would greatly appreciate the loan." (Lissen 7 Superhet.)

Herewith is another letter from A. N. (Nottingham) on the same subject:

"In reply to your article on radiogramophones, I am giving you my point of view. In the first place I am wholly in favour of sets with grammo. sockets with appropriate switching. With such sets one can make or buy a cabinet incorporating electric motor and pick-up arm, and a nice, roomy record compartment, making a very fine piece of radio furniture. I find with modern sets and a grammo. attachment as described above that the quality compares very favourably with the complete radio-gram, and as your records are so conveniently to hand the grammo. attachment is used more often, thus giving more pleasure. With the complete radiogram there is no record space or cupboard. I honestly believe that sets with grammo. sockets, in conjunction with a good commercial grammo. attachment, are the best proposition."

#### If You Want to Know the Time. . .

EVERY radio fan now adjusts his clock and/or his watch by means of the six pips which are accurate to  $\frac{1}{3}$  of a second per day. My readers may not know, but I am an amateur horologist, and I have just succeeded in tuning a watch I picked up for a few shillings to a limit as accurate as the six pips. These tests were first instituted in 1888, just over 50 years ago, and very few watches have managed to secure the hall-mark of the almost perfect watch, namely, a Kew A certificate. The test lasts for 44 days during which the watch is tested in extremes of temperature and in various positions. A watch which just passes the test obtains a certificate, but marks are

## Notes from the Test Bench

### Dust Leakages

ALTHOUGH dust can cause noises in certain parts of a receiver, its effects may be much more serious. Dust inside variable condensers generally gives audible warning of its presence by crackling noises as the condenser is rotated, but in modern receivers there are several places where dust can gradually accumulate and eventually cause a short-circuit. Although the layer of dust may not carry much current when in a dry state, in a moist atmosphere the current may be sufficient to prevent satisfactory working, and a case of this nature recently came to our notice where the dust had formed a leakage path across the trimmers of an I.F. transformer. The result was that H.T. was being applied to the grid of an I.F. valve and preventing it from functioning by making the grid slightly positive. A good clean with the blower attachment of a vacuum-cleaner periodically is a good idea with modern receivers which are not dust-proof.

### Capacity Aerials

WE repeatedly receive readers' wrinkles in which the hint is given that a bed-mattress makes a good aerial. The idea of a large metallic surface acting as an aerial is, of course, very old, and there are many commercial types of aerial in which an elevated capacity is used in this manner. In some types of portable or self-contained receiver it is also possible to make use of the idea by fitting a large plate of copper beneath the lid of the cabinet, and connecting this to the aerial terminal. In flats or other places where a short direct earth is difficult to provide, it will also be found that a similar plate placed beneath the bottom of the cabinet and connected to earth will prove very efficient. This idea was, in fact, incorporated in the first receiver to be provided at Buckingham Palace.

### Neutralising

THE early types of receiver in which H.F. amplification was employed made use of a small capacity coupling anode and grid. This was to remove oscillation by balancing out inter-valve capacity, and although the idea is not now needed with S.G. and H.F. pentode valves, it is still very valuable in transmitters where triode P.A. stages are employed. Special condensers should be used for this purpose, however, and old pattern neodyne condensers are not generally suitable for the high working voltages which will be found in the P.A. stage.

awarded when the watch improves upon the limits laid down on the tests. A perfect watch would have 100 marks—40 for consistency of rate, 40 for constancy of rate with change of position, and 20 for temperature compensation. My watch was submitted from April 1st to May 15th, and obtained 78 marks out of the maximum 100. Its mean variation of rate is .2 (1/5th) second per day; its mean change of rate per degree F., only .09 seconds per day, and in respect of consistency of rate obtained 35.9 marks out of the maximum of 40, 28.1 out of a maximum 40 for constancy of rate with change of position, and 14 marks out of 20 for temperature compensation. With my watch I am now able to tell you whether the pips are accurate! One interesting fact emerged during the seven months I spent adjusting this watch, and that is that mains clocks, contrary to popular belief, do not tell the exact time throughout the day. During one period they were 21 seconds out in the day, although, of course, they are corrected each day.

### The Orchestral Library

THE B.B.C. Symphony Orchestra is remarkable, both in size and for the number of programmes it performs—few large orchestras of the world are an integral part of a broadcasting organisation; therefore, they do not usually play so many different programmes. Mere figures convey but a poor impression of the value of the Orchestral Library which the B.B.C. has, consequently, to maintain. But they may at least give an idea of its extent.

Actually, the library is one of the biggest in the world. It contains, for example, some twenty-seven thousand separate works—and an orchestral work may very well consist of anything from ten to one hundred and twenty separate pieces of printed music. To these may be added the score of the conductor, scores for use in the Control Room and for the technicians who "balance" the music according to the wishes of the conductor.

And because some work may be required the same week in the programme of one of the Regional stations, there is an "A," "B" and "C" Library containing 5,000 works. . . .

Six large rooms at Broadcasting House are occupied by the library, where a staff of thirty-three people are working full time. Excitement, speed—and temperament—cause orchestral music exceptionally hard wear—and the repairs department keeps four people busy every day.

# Receiver Testing Fallacies

Details of Mistakes that are Often Made, and Some Notes on the Correct Methods to be Followed

IT is very easy to make a slip when carrying out even routine tests of a receiver, especially if a copy of the wiring diagram is not kept in sight. An example of this was exemplified recently when a thoroughly experienced experimenter made what he later found to be a foolish blunder in checking through the mains unit of an amplifier.

Before connecting it to the amplifier valves he wished to make a test of the output and to ascertain that all voltages were correct. And as he had made use of a mains transformer which had not been in use for some time he thought it desirable to make sure that this was not below par. A high-grade multi-range meter was used, this being set to read A.C., and the voltage on each side of the centre tap of the H.T. winding of the transformer was measured. A similar reading of slightly under 400 volts was obtained for each half, which was correct, for the component was to be used with a full-wave rectifying valve taking up to 500 volts on each anode.

As a check for leakage between H.T. and filament windings the meter was temporarily connected between the centre tapping of each. Of course there was a voltage reading because the valve had not been removed from its holder. The valve was then removed and the test repeated; no reading. Another test was made by connecting the meter to one end of each of the two windings. To his surprise, a reading of approximately 380 volts was shown by the A.C. meter. For a few minutes the experimenter was stumped; and probably you would have been. It was not until he had made some additional tests with the transformer disconnected from its external circuit that he realised why a reading had previously been obtained—for there was no doubt that the component was in perfectly good condition and entirely free from inter-winding or core-winding leakage.

## The Reason

The explanation should be clear from

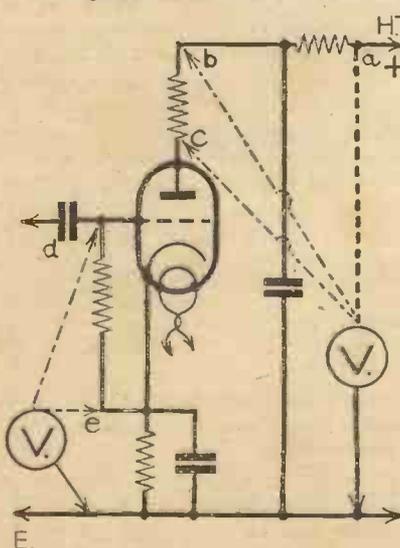


Fig. 2.—Especially care must be taken when attempting to measure anode and grid voltages.

Fig. 1. Have you spotted the slip? When the transformer was connected and the rectifying valve was removed from its socket there was no reading between the points marked 1, but there was one between

*by The Experimenters*

those marked 2. If you have not yet "tumbled," the explanation is that the supply was A.C., and that the circuit between the centre tapping of the H.T. winding and the L.T. winding was completed by the two smoothing condensers. These would have been insulators for D.C., but on A.C. an 8-mfd. condenser (the

place, the reading would not take into account the voltage drop across the two series resistors in the anode lead. In the second place, the resistance of the meter would be in parallel with that of the valve, and its anode resistors in series; consequently, part of the H.T. supply would pass through the meter so that the reading would be slightly less than the voltage provided by the H.T. point.

## Parallel Resistances

The position is not improved by transferring the positive lead from the meter to the points marked b and c. When connected to b there is still the anode resistance in series with the valve anode, and when connected to c there are actually three resistances in parallel: that of the valve

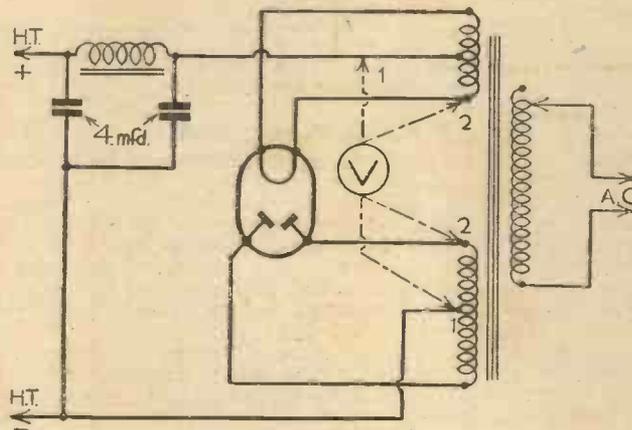


Fig. 1.—Points at which unexpected meter readings were obtained when testing a power unit using a full-wave rectifying valve and mains transformer.

capacity of the two in parallel) has an effective resistance of only about 400 ohms at 50 cycles. When using a high-resistance meter such a resistance is negligible as far as the reading is concerned.

## Measuring Anode Voltage

A mistake is often made in determining the voltage applied to the anode of a valve. Even when a battery is used for H.T. supply you cannot tell the voltage by noting the tapping used to feed that anode, for there is always a resistance of some kind in the anode circuit. This might be only a few hundred ohms, through the primary winding of an L.F. transformer, or several thousand ohms, through a coupling and/or decoupling resistor. Thus, an initial voltage of 100 would be reduced to 50 if there were a series resistor of 5,000 ohms and the valve passed 10 mA. In the same conditions the voltage drop would be only 5 if the total anode resistance were only 500 ohms.

The matter is not greatly simplified even when a good-quality high-resistance voltmeter is available, for reasons which are shown diagrammatically in Fig. 2. If the negative terminal of the meter were connected to the earth line, and the positive one to H.T.+ (the point marked a), the reading would be valueless. In the first

(A.C. resistance or impedance), that of the meter, and that of the two resistors and H.T. supply all in series. It will be seen, therefore that the indicated voltage might differ appreciably from the actual voltage.

(Continued overleaf)

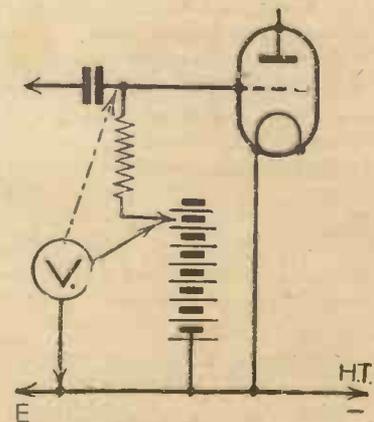


Fig. 3.—Full lines indicate the voltmeter leads when measuring the bias voltage in a battery set. There may not be any reading when the meter is connected as shown by the broken line.

**RECEIVER TESTING FALLACIES**

*(Continued from previous page)*

In fact, the only value of this test would be in finding whether or not an anode voltage was being applied to the valve. With a cheap, low-resistance meter it is even possible that no voltage reading would be given.

**Voltage from Current**

The only convenient method of determining the correctness of the applied anode

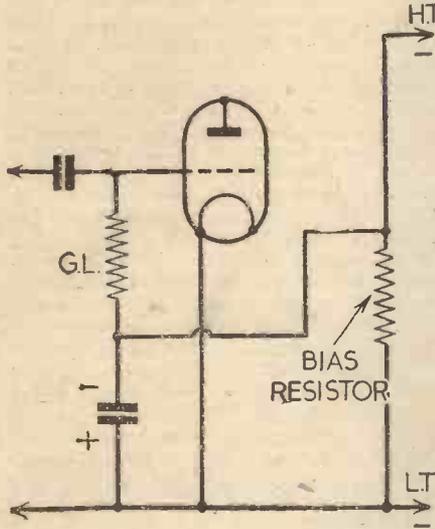


Fig. 4.—Usual connections for automatic bias in a battery set. The bias voltage is developed across the resistor.

voltage is, peculiarly enough, by measuring the anode current by means of a milliammeter. If this were inserted at the point marked X, the current consumed by the valve could easily be found (provided that the resistance of the meter were not high by comparison with that of the anode-circuit load). By comparing the current with that shown on the curves for the particular valve in use it would be possible to obtain a fairly accurate indication of the actual plate voltage.

To permit of this being done, however, it

would be necessary to know the grid-bias voltage. This could be measured with sufficient accuracy for most purposes by connecting a high-resistance voltmeter between the earth line and the upper end of the bias resistor—in the case of a mains set—to the point marked e in Fig. 2. It is important that the meter should have a very high resistance compared with the value of the bias resistor, because if this were not the case we should again have the position of two parallel resistances, the overall value of which is less than that of either component separately. A factor which might easily be overlooked is that a correct reading might not be obtained if the negative side of the meter were connected directly to the grid of the valve at the point marked d. In that case the grid-leak resistor would be in series with the meter, and since this might have a value up to one megohm or so its effect would be marked. In normal running conditions there is not, of course, any voltage drop across the leak due to the fact that grid current does not flow—the bias is merely a potential applied to the grid.

The same conditions apply when dealing with a battery receiver, and in this case the meter should be connected between the positive end of the bias battery and the tapping point employed, not to the grid of the valve. This is illustrated in Fig. 3. When dealing with a battery set having automatic grid bias, as shown in Fig. 4, measurements should be taken in the same manner as for a mains set; that is, the high-resistance meter should be joined across the bias resistor.

**Anode Current Totals**

A mistake is sometimes made when checking the total of individual valve anode currents against the total current found by inserting the milliammeter in the H.T.—lead. It is frequently found that the sum of the currents is appreciably smaller than the single total reading. A search might then be made to find where leakage is taking place, but without result. This is because it has probably been overlooked that there is a potentiometer across the H.T. supply, used to feed the screening grids of the frequency-changer and I.F. valves, or to feed the S.G. of the H.F. valve. A correction must be made by connecting a

milliammeter in series with the potentiometer to find exactly what current it is passing.

**Coil Testing**

Another fairly common mistake is often made by constructors wishing to check the resistance of coil windings, and also the change in resistance when the wave-change switch is operated. When an ohmmeter is not available—and few constructors have one—the best course is to use a low-resistance ammeter in series with a small,

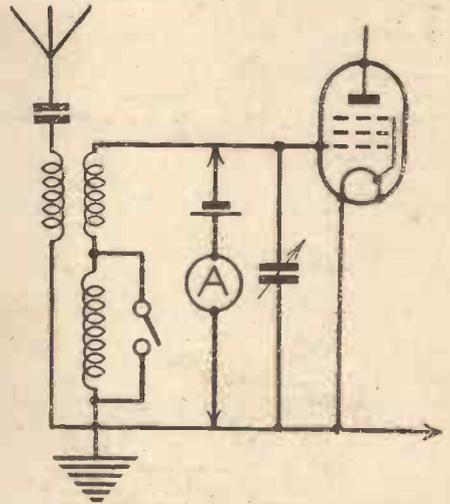


Fig. 5.—A simple method of measuring the resistance of a tuning coil set to medium and long waves.

dry battery, as shown in Fig. 5. Thus, if a 1½-volt dry cell were used in conjunction with an ammeter reading up to one amp., the readings at long- and medium-wave positions of the switch for a coil with resistances of 2 and 5 ohms for the M.W. and L.W. windings would be approximately .75 and .2 amp. If the method of using a milliammeter in series or parallel with a fixed resistor were employed (and this is often convenient and sufficiently accurate) the difference in readings probably could not be detected

**BROADCAST EVENTS OF THE WEEK**

**NATIONAL (261.1 m. and 1,500 m.)**  
 Wednesday, June 7th.—Othello, acts 1, 3 and 4, from Covent Garden.  
 Thursday, June 8th.—American Humour, feature programme.  
 Friday, June 9th.—The Trial of the Glasgow Cotton Spinners, a play.  
 Saturday, June 10th.—Aldershot Tattoo.  
**REGIONAL (342.1 m.)**  
 Wednesday, June 7th.—Roundabout, an all-Regional variety programme.  
 Thursday, June 8th.—Dignity, a play by Teresa Deevy, from Northern Ireland.  
 Friday, June 9th.—A Northern Entertainment Tour from Blackpool.  
 Saturday, June 10th.—Dance Band programme.  
**MIDLAND (296.2 m.)**  
 Wednesday, June 7th.—Studio variety.  
 Thursday, June 8th.—Light Listening, a radio magazine.  
 Friday, June 9th.—Water Folk, a song sequence by Martin Shaw.

Saturday, June 10th.—Band programme.  
**WELSH (373.1 m.)**  
 Wednesday, June 7th.—When Day is Done, soothing melodies, old and new.  
 Thursday, June 8th.—Cardiff's Oldest Theatre—memories of the Palace.  
 Friday, June 9th.—Dolgellau Dirion: Fair Dolgelly Town, a feature programme.  
 Saturday, June 10th.—Farmhouse Night Entertainment.  
**WEST OF ENGLAND (285.7 m.)**  
 Wednesday, June 7th.—The House and the Man: Thomas Hardy at Max Gate, a talk.  
 Thursday, June 8th.—Organ and choral concert, from the Guildhall, Southampton.  
 Friday, June 9th.—Cocklemouth Comet, No. 2, The "Comet" covers a wedding.  
 Saturday, June 10th.—Dance Cabaret, from the Polygon Hotel, Southampton.

**NORTHERN (449.1 m.)**  
 Wednesday, June 7th.—The Royal Air Force, a feature programme of life in the Junior Service recorded at Catterick Camp.  
 Thursday, June 8th.—Three Short Plays.  
 Friday, June 9th.—A Northern Entertainment Tour from Blackpool.  
 Saturday, June 10th.—Orchestral and instrumental programme.  
**SCOTTISH (391.1 m.)**  
 Wednesday, June 7th.—Flute Tunes: A recital.  
 Thursday, June 8th.—Gaelic Concert.  
 Friday, June 9th.—Concert Party programme.  
 Saturday, June 10th.—Scottish Dance music.  
**NORTHERN IRELAND (301.1 m.)**  
 Wednesday, June 7th.—Inter-Schools Spelling Bee: Method v. Inst.  
 Thursday, June 8th.—Dignity, a play by Teresa Deevy.  
 Friday, June 9th.—Cricket: Ulster v. Leinster, a commentary from the Northern Ireland Cricket Grounds, Belfast.

A PAGE OF PRACTICAL HINTS

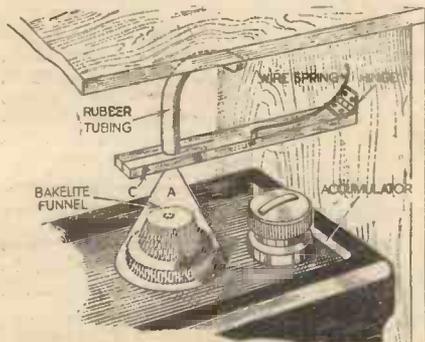
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Trap for Acid Fumes

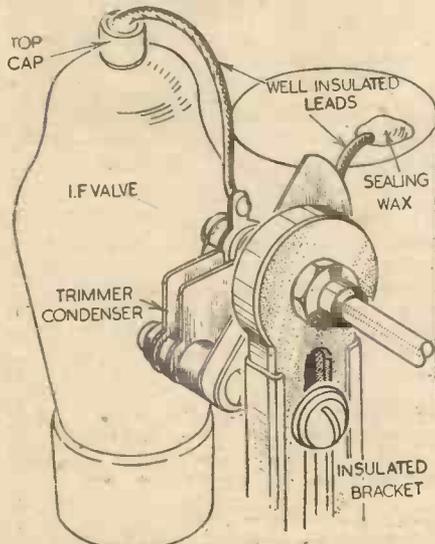
MUCH damage can be caused by the corrosive action of acid fumes when the accumulator is housed inside the cabinet. In addition, if the accumulator is being trickle-charged, the danger of minute drops of acid spray is ever present. To ensure against further damage to a set which had



A novel dodge for trapping acid fumes from an accumulator.

been cleaned and repaired, the "fume trap" shown in the sketch was tried and proved successful.

A short length of rubber tubing is attached to a small bakelite funnel "A," while a piece of wood, "B," has a small hinge fixed to one end, and is drilled and slotted at the other. This hole should be the same diameter as the tubing where it is connected to the funnel. Slip the tubing through the hole and tighten the screw "C." Fix a piece of spring wire into the hole, drilled through the centre of the wood, and shape it as indicated. Finally, screw the hinge to the inside of the cabinet in a position which will allow the wood to be 1½ in. above the top of the accumulator.



A method of applying reaction to an I.F. stage.

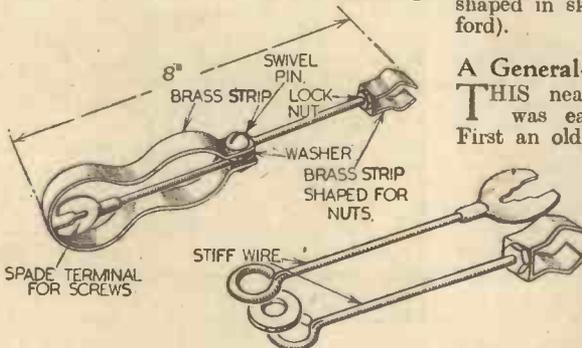
THAT DODGE OF YOURS!

Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL AND AMATEUR WIRELESS," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be original. Mark envelopes "Radio Wrinkles." DO NOT enclose Queries with your wrinkles.

SPECIAL NOTICE

All wrinkles in future must be accompanied by the coupon cut from page 303.

The inside of the funnel can now be lined with a cone-shaped piece of blotting paper, taking care not to cover the hole leading to the tubing. Place the accumulator inside the cabinet in a position which will allow the funnel to cover the filler cap.



A useful tool for holding screws in awkward corners.

Fumes are led outside the cabinet by the rubber tubing, which should be clipped to the back cover at any convenient point.—ALEC DAVIE (Edmonton).

Applying Reaction to an I.F. Stage

HERE is a rather novel way of applying regeneration to the I.F. stage of a superhet, giving a great increase in sensitivity and selectivity, particularly the latter.

First I soldered a lead to the grid of the I.F. valve (top cap in my case) and connected it to one side of a small variable condenser—an old-type air trimmer I had on hand. The lead—a well-insulated one—from the other side of the condenser, I pushed into the last I.F. transformer can, through a hole already there for a grid lead. As the following valve is a diode it is unused.

With the condenser half in mesh, I pushed the lead into the I.F. transformer can until the stage was just oscillating. A few experiments soon found the right position for smooth control, and then a drop of sealing wax fixed the lead permanently.

In the first "hook up" the regeneration control altered the tuning, but this was cured by using low-loss mountings—a small piece of Trolitul I had left—and an insulated extension rod for control from the panel.

The main advantage of this arrangement is the great increase in selectivity—in fact, on the crowded 40m. band, there are very few amateurs that I cannot get in the clear by the use of the control. The condenser is mounted on a bracket, as shown in the sketch, as close as possible to the valve.—W. J. MARKWICK (Windsor).

A Tool for Awkward Corners

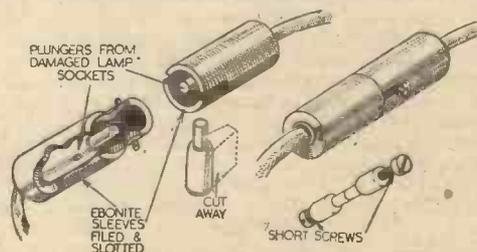
BEING faced with the problem of getting some screws in awkward corners, I made the device shown in the sketches. I obtained a strip of brass and shaped it to form the handle. I then drilled two holes through the ends for a ¼ in. swivel-pin to pass through. I then got two pieces of stiff wire, turned the ends, and soldered at the other end of one a terminal spade. At the end of the other wire I fastened, by means of lock-nuts, a piece of brass, as shaped in sketch.—F. HOLFORD (Hednesford).

A General-purpose Connector

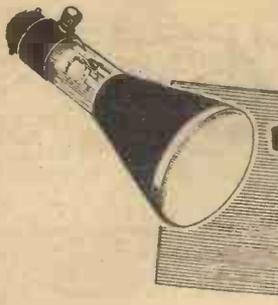
THIS neat general-purpose connector was easily made from odd junk. First an old lamp socket was dismantled and the plungers taken and filed as required, then a piece of ebonite rod was shaped and drilled, or two ebonite sleeves can be used for insulated caps, one of which will have a slot and the other a peg. The leads are taken through the ends of the sleeve attached to the screw at the end of plungers, and the whole plunger then slid back into the sleeve. The connector is pushed together, and a slight twist locks the two ends fast. The sketches show the idea clearly.—C. ELLIS (Watford).

PATENTS AND TRADE MARKS

Any of our readers requiring information and advice respecting Patents, Trade Marks or Designs, should apply to Messrs. Rayner and Co., Patent Agents, of Bank Chambers, 29, Southampton Buildings, London, W.C.2, who will give free advice to readers mentioning this paper.



A handy general-purpose connector made from odds and ends.



# Practical Television

June 10th, 1939. Vol. 4. No. 155.

## A Swift Move?

A FEW days ago the Postmaster-General received a deputation from the Radio Manufacturers' Association. The object of this meeting was to urge that steps be taken at once to establish a B.B.C. television station in the provinces, and became effectively the first important move of the national campaign which has been organised to press for a station in the Birmingham area. It was pointed out that if other countries in the world established transmissions on different systems, then an enormous potential export market would be lost to Great Britain, which to-day held a two and a half years' lead over other countries. Although in the London area television sets are being sold at a high rate, large-scale production cannot be put in hand by the manufacturers until the wide area of potential viewers in the Midlands is opened up. It is certain, too, that if the step was taken by the Government it would remove the experimental atmosphere from the London transmissions, and so break down the last sales resistance of possible set purchasers who feel that the present service is not really stable. In replying to the manufacturers, Major Tryon promised to give full weight to the representations made by the deputation, and a full meeting of the Television Advisory Committee under the chairmanship of Lord Cadman has been called so that a report can be made to the P.M.G. If one judged by the replies given to questions in Parliament on this same subject, it would seem on the surface that there has been some manoeuvring to postpone a decision by arguing the respective merits of the coaxial cable, and a series of directional micro-wave radio links. Such tactics really beg the question, and all the argument really means is that there are two possible methods already in existence, either of which would be used with a virtual certainty of success, for linking other stations with the Alexandra Palace. These technical matters are often brought in to act as a red herring, but by making an offer of financial assistance on clearly-defined terms the R.M.A. has offset the obstacle, which is really finance, and if only the Treasury could be persuaded to follow a bold policy, then success would be assured.

## C.R. Tube Scanning

IN the usual forms of cathode-ray tubes used for television picture reconstitution the movement of the beam of electrons is undertaken by variations in an electrostatic or electromagnetic field through which the beam is made to pass. In spite of difficulties, some of which are very largely associated with linearity of spot movement over the available scanning area, the results have been satisfactory. This has in no way, however, prevented the development of other schemes designed to achieve the same ends in another way. One of the most interesting of these proposes to provide an electron stream control by actually reflecting it from an equipotential surface

set up within the tube envelope. With an ordinary light beam, it is reflected from a surface so that the angle of incidence equals the angle of reflection. The same law holds good with an electron stream, and the main idea of the invention is to vary the contour, on inclination of the equipotential surface, in such a way that the beam is made to traverse across the fluorescent screen in a series of juxtaposed lines at the correct line, and frame scanning frequencies.

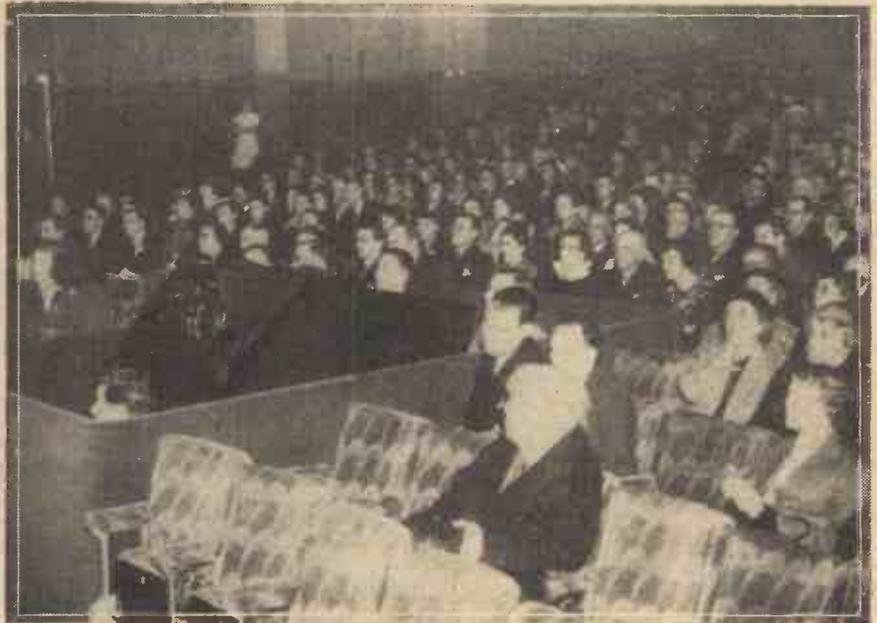
## Television and Boxing

IT seems certain that in the very near future the art of boxing and the science of television will be very closely linked together. This will inaugurate a new era for the very large section of boxing supporters, and better financial days for the boxers and organisers themselves. It is not so much the home viewing angle which is likely to bring this about, but the fact

rearmament purposes, and although but little has been heard for the past few weeks concerning big-screen television, those who realise its importance have been quietly at work behind the scenes. Once the important London cinemas have been equipped it is anticipated that the Government will by then be engaged in erecting one or more provincial stations. Provincial cinemas will then follow suit with their big-screen equipment, and so the potential audience for boxing matches, or any big sporting event for that matter, will grow in leaps and bounds. Revenue from this source will then amply reimburse the promoters, and enable them to stage items which lack of finance has prevented up to the present. Legal aspects will quite probably loom large, but all these matters should be capable of satisfactory solution. Mr. Isidore Ostrer quite rightly maintains that big-screen television will provide an equality of culture, and enable both rich and poor to enjoy the excitement of national events together—one at the source itself, and the other in a comfortable seat at the cinema. There is no doubt that television is radio carried to its logical conclusion, and it is becoming generally apparent that whereas the radio industry thought originally that cinema television would be a menace to home sales, they are now regarding it as an excellent advertisement.

## A High Mast?

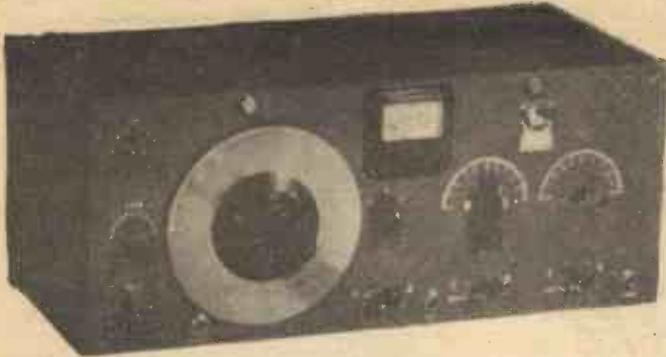
IT has been suggested in some quarters that consideration is being given to the erection of an enormously high mast,



The Derby was televised and thrown on to cinema screens for the first time on May 24. Our illustration shows the audience at the New Victoria Cinema watching the screen. On left can be seen the television projector.

that cinema audiences can see the match by big-screen television, as proved conclusively by the three recent important matches held in London. While it is appreciated that at the moment there is a ban imposed by the British Boxing Board of Control, London boxing promoters have got together and announced that they intend forming their own association. The idea which is now being developed is the provision of regular televised fights on cinema screens, and every effort is being made to expedite the installation of receiving equipment in theatres for this purpose. Small delays have arisen because of the demands imposed on certain firms for

at the summit of which would be a television transmitting aerial array. The height mentioned is 1,500 feet, it being said that this increase in height would result in a service area radius of 350 miles. Little credence is given to the idea in official quarters, for the feeder cable losses in passing the signal from the base to the summit of the tower would be very material unless extremely expensive cable was employed. Then, quite apart from any technical and constructional difficulties, there is sure to be a measure of fading experienced, and in addition the power of the London station would have to be increased enormously.



# A COMBINED TRANSCEIVER

Designed Primarily for the Amateur Newcomer this New Transmitter-receiver makes an Excellent Portable Station - By McMurdo Silver

**R**ADIO is one of the hardest of all hobbies to get started in. There is literally no concise, simple and logically progressing literature designed for the would-be amateur—the avid outsider looking in. Excellent handbooks and engineering treatises are available—but are just so much Greek to the beginner. Most of us, being human, and still quite “small boys” at heart, don’t want to take up a hobby which requires months of hard, drudging study to master enough theory to make an actual start. We want to start “playing,” learning as little or as much as we desire as we go along. This is the almost unsurmountable barrier between the beginner and the exciting thrills coming from actually “getting on the air” with an amateur sending and receiving station. In amateur radio, the beginner is the “forgotten” man.

The author was finally made conscious of this sad condition by Dave Warner, W9IBC, and herein are described the form his efforts to help beginners to get into amateur radio have taken. They go even farther than the barest tyro’s satisfaction, for in producing a complete transmitter and receiver—a complete amateur station less only key, headphones and aerial—he has also carefully considered the needs of the opposite end of the amateur spectrum, the experienced operator desiring a compact and portable sender-receiver for holidays, car and emergency operation. Embraced in the “Send-Ceiver” is simplicity needed by the beginner coupled with such advanced features as 6-band transmitter and receiver band-switching with performance capable of giving an amazing account of itself in local “rag-chewing” or distant “dx”—as has been proved in actual amateur operation.

## Neat in Appearance

From commercial appearance, from front panel to the last detail of construction, the “Send-Ceiver” is professional, and something of a marvel in that its full professionalism is well within the constructional capabilities of the veriest tyro. Eschewing entirely the circuit and mechanical complexity so attractive to the usual engineer, the writer, in conjunction with the engineering staff of Edwin I. Guthman and Co., Inc., hewed directly to the line of highest efficiency—the maximum of results for the minimum of complexity. In this day of multi-valve superheterodyne receivers altogether too much sight is lost of the fact that for sensitivity to bring in weak, distant signals and interference-piercing weak-signal selectivity, there is still nothing better than the simple regenerative receiver. It is still the stand-by of a major percentage of all amateurs—and it is significant that the consistent long-distance operators all too frequently are found using, not an “umpty-umph valve blooper-dyne,” but the simple one or two valve

regenerator. It always works, and is so simple that it’s hard to build it wrong, or have it spring a failure just when a receiver is most desired. From a pure long-distance standpoint, the simple regenerative detector and one stage audio amplifier will reach out and get as many stations as the “multiest” tube superhet yet devised—and do it without the fuss, complexity and ear-splitting noise of many bigger receivers.

Again, the popular delusion that for a transmitter a “power house” will do a materially better job than a simple little rig was sedulously avoided. Here, too, winners of distance championship laurels are seldom found using the full legal allowance of one kilowatt transmitters. Quite the contrary, for they have realised that 100 watts is “down” only 10 decibels from 1,000 watts, and that 10 db. doesn’t make a whale of a lot of difference in distance worked or dependability of contacts. They know that 10 db. is less than two “S” units—just a comfortably notice-

or discarded penny. It can be used as an “exciter” for much more powerful amplifiers if, as the beginner grows up, he joins the “kilowatt” parade of more power and cost for little real improvement in distance range.

## The Controls

The “Send-Ceiver” front panel, illustrated above carries all receiver controls at left and all transmitter controls at right. The small knob at the upper left is the receiver tuning condenser, or band-setting knob. In operation, it is set to the edge of any amateur band from 5 to 160 metres (or is used to tune regular and short-wave broadcast bands which the receiver also covers), after which stations in the desired band are tuned in on the large 5/16 in. “vernier” band-spread dial, on which they come in comfortably spread apart—for easy tuning even as low down as 5 metres. The lower left knob is the master on-off switch and receiver volume-regeneration control. Set up to just below oscillation, as evidenced by a hiss in the headphones

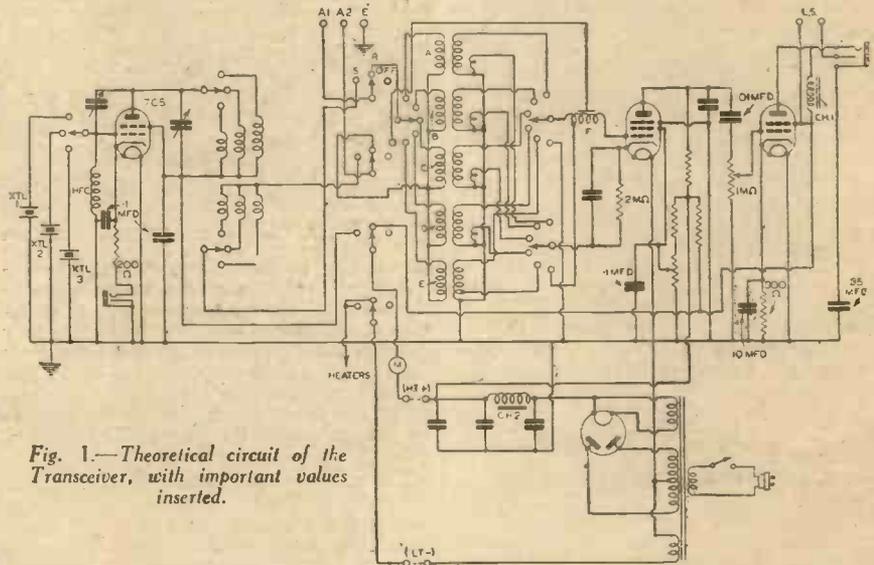


Fig. 1.—Theoretical circuit of the Transceiver, with important values inserted.

able change in volume, but far from what would be expected from a ten-time power increase. So in the “Send-Ceiver” the transmitter is a simple, fool-proof crystal controlled 10-15 watt affair—only a hair over 7 db. down from a 100-watt rig, and capable of going plenty of places in national—and international—distance range. It is so arranged that it can be added to as desired, and starting as a simple one-valve crystal oscillator, can grow to a two-valve, 15-watt m.o.-p.a. rig, to which can be then added one or two valves to turn it into a telephone transmitter for voice-phone as well as c.w. telegraph transmission—as the beginner advances to such stages. All this is accomplished without a wasted

(with stations heard as a squeal), it provides for selective long-distance voice and broadcast reception. Set just above this point, or just beyond critical regeneration, c.w. telegraph stations the world over can be tuned in—with, actually, more effective selectivity than it possible to any but a regenerative superhet, or one having a crystal filter. Like the regenerative superhet, the “Send-Ceiver” receiver gives that “essential in between” selectivity so badly needed in amateur phone bands and not provided by the crystal-in-crystal-out choices of the average expensive superhet. At the upper left is the audio volume control—essential in this super-efficient two-valve set to prevent blasting

## A COMBINED TRANSCIVER

*(Continued from previous page)*

the loudspeaker, so great is its "bong." To the lower left of the dial is the headphone jack—with loudspeaker terminals on the rear, for this super-efficient two-valve receiver will play local and foreign stations on a simple loudspeaker very well indeed. At the top centre is a hole for a milliammeter for the transmitter, when it can be afforded. This hole is ordinarily covered by a neat disc, as illustrated. Directly below is the six-band wave-change switch knob, and below and toward the left, the sending key jack and send-receive switch which shifts power from receiver to transmitter, and shifts antenna connections, too—the acme of modernity.

The microphone jack is at the extreme lower right, not used in the one-valve transmitter illustrated, but included for appearance. To its left is the 3-position oscillator crystal circuit wave-change switch, with to its upper left the plate tuning condenser knob and dial scale. Each plate circuit switch position covers two out of six amateur bands, shift from one to the other being accomplished simply by rotating the oscillator plate condenser knob. Just to the right is a blank dial scale (covered by a blank plate until the builder desires to expand the transmitter to two valve m.o.p.a.) with below it the 3-position plate circuit switch (the crystal switch will also switch oscillator plate coils when the transmitter grows to two valves, the right dial and switch then controlling both crystal and oscillator plate circuits). Any one of three crystals set in 10, 20, 40, 60 and 160-metre amateur bands can be instantly selected at will—in fact, band change with the "Send-Receiver" transmitter is as fast as on the most expensive commercial transmitters—perhaps even faster. In one-valve form, with three crystals plugged into their sockets, instant choice of three-band operation is had, while two additional bands can be covered simply by swapping crystals. In two-valve form, when the amplifier may also double the crystal frequency, six bands can be instantly covered by using one each 160, 40 and 10-metre crystals. Here is, indeed, flexibility second to none. And before proceeding further, it might be mentioned that this combination of beginners' and experts' delight can be bought as a complete kit, for about \$25.00—at long last justifying in concrete form that ever-recurring statement that the beginner can get on the air for around \$25.00—something heretofore well-nigh impossible.

The receiver, illustrated above at Fig. 2 with its neat layout of parts seen above, with the sub-chassis assembly below in Fig. 4, uses two of the newest valves. The new 6SJ7 (single-ended 6J7) sharp-cut-off r.f. pentode functions as a high-sensitivity regenerative (autodyne) detector, followed by one of the new Loktal 7C5 (new version of 6V6) beam power valves. A three section, low-loss wave-change switch, having six well-spaced contacts for low inter-circuit capacity carries six individual coils (shown in the theoretical circuit, Fig. 1) mounted directly on its contacts. Coming as a complete factory-assembled and wired coil and switch system, it achieves connections as short and direct as with plug-in coils, plus the lower losses possible to the better quality of insulation of the individual coil forms and wave-change switch. Each coil consisting of aerial primary and separate secondary is short-circuited to prevent absorption losses except for the one coil selected for reception by SW1. These coils are tuned by a new positive-

single-bearing "band-set" tuning condenser of 156 mfd. capacity, with "band-spread" provided by an identical but smaller 15 mfd. condenser. Thus sharp short-wave stations are well spread apart upon the large 5½ in. "Butler"-finished dial. The six bands so provided tune from well above 600 metres for ship and distress calls right on down through the 5-metre amateur band without a "dead-spot" anywhere in between.

A time-tried and proven method of obtaining regeneration is used. The most obvious method would be to tap the cathode of the 6SJ7 up about one-quarter of total turns on the secondary, and this would work. However, tapping the cathode up thus would impair its "Q" or excellence, particularly at the lower frequencies, and not be conducive to best results in this simple circuit where every bit of efficiency has been zealously guarded. Therefore, this is done only on the last two bands, where it is essential to get oscillation. On the other four bands, where extreme

volume. When the 'phone plug is pulled out, and a 5,000 ohm loudspeaker is connected to the two terminals marked "LS" in Fig. 1, the 7C5 "sees" just a bit less than 5,000 ohms—the condition for maximum power output such as is wanted in loudspeaker operation.

So much for the receiver output. It is simple, ultra-effective and will reach out when using a small antenna through bad interference and pull in c.w. stations across the world—and do almost as well on voice reception (London on the loudspeaker is "duck-soup" in Chicago!). For battery operation, using a 6-volt storage battery for the filaments (more properly, heaters) only the parts in Fig. 1 at the upper left of the dotted lines are necessary, with 90 to 250 volts of H.T. battery connected, negative to chassis earth and positive to the wire marked "H.T.+"

At the bottom of Fig. 1 is the A.C. power supply unit for both transmitter and receiver, with A.C. on-off switch mounted on P1 and operated as its knob is turned to the right at start of rotation.

The filament or heater circuit of all valves is also controlled by the send-receive switch at the upper centre of Fig. 1, so that whether power be A.C. or batteries, control of either is complete at the front panel. Provision for battery operation exists in the power unit by virtue of the two groups of terminals marked "H.T.+" and "LT." Disconnecting each of these terminals from its mate allows batteries to be connected to the left terminals for portable operation as when A.C. is not available—or with omission of A.C. power supply, for permanent battery operation in unelectricified areas. The power supply consists of power transformer, filter choke CH2, and the three filter condensers. These are in one single container seen in Fig. 1.

Occupying the chassis space at the left of Figs. 2 and 3, and the upper left of Fig. 1, is the one to four-valve transmitter with space left upon the chassis and panel for the addition of an H.F. power amplifier when desired, as well as a one- or two-valve modulator for 'phone operation when using a carbon (7C5) or crystal (7C5 and 8SJ7 valves) microphone respectively. Only the simplest version, a one-valve, 5-band, crystal-controlled 10-15 watt c.w. telegraph transmitter is here described. It consists of a 7C5 beam power valve as a crystal oscillator with choice of one to three crystals in any amateur band or bands from 10 through 160 metres. Crystal selection is by means of lever switch SW2, which while shown as single-pole-three-position, also carries a duplicate set of such contacts, which when the "rig" grows to two-valve m.o.p.a. is used to switch oscillator plate coils which are added at the right of the chassis. In single tube form, the oscillator plate circuit uses the coils L2, L3, L4 switch SW3 and tuning condenser C12, which would be in the power amplifier plate circuit when the second tube is added. This saves wiring changes as the "Send-Receiver" grows. Cathode bias by means of resistance and by-pass condenser is used, together with a new type of H.F. grid choke HFC now available which is effective right down

*(Continued on facing page)*

Fig. 2. Chassis layout, showing arrangement of parts.



Fig. 3. Underside component layout and wiring.

selectivity is most important, separate "tickler" coils in the common cathode circuit result in the 6SJ7 detector going into oscillation so smoothly that the only evidence is the change in character of signals from voice to voice accompanied by the heterodyne squeal necessary to c.w. telegraph reception. Regeneration is controlled by potentiometer P1, varying 6SJ7 screen voltage, with P1 by-passed for noise by C6.

The audio output of the detector is fed, through usual r.f. isolation by-pass condenser on to the grid of the 7C5 audio power amplifier by usual resistance coupling—plate load resistor, grid blocking condenser and grid leak. The 7C5 is biased negatively by resistor R8, by-passed for good bass tone reproduction by electrolytic condenser C9. For greatest power output, the C6 should have a plate load resistance of 5,000 ohms, such as would be provided by the input transformer of a dynamic loudspeaker. For greatest voltage amplification, as for maximum volume on weak signals heard through headphones, the 7C5 plate load resistance should be much higher. So, for headphones plugged into jack J1, and insulated from direct current by condenser C10, the 7C5 "sees" a load of choke CH1 of much higher than 5,000 ohms shunted by the impedance of the headphones, thus giving greatest

**A COMBINED TRANSCEIVER***(Continued from previous page)*

through 5 metres. A keying jack, is in the cathode circuit, while voltage regulation of the power supply is so good that keying is clean and free of "chirping" due to voltage variation with keying. Screen voltage is provided through a voltage divider, with screen by-passed to earth for H.F. by condenser and with the plate H.F. by-pass condenser. Three plate coils L2, L3 and L4, together with 165 mfd. tuning condenser C12, enable the plate circuit to cover two adjacent amateur bands for each coil, coils being selected by lever switch SW3, which also through duplicate sets of single-pole-three-position contacts as upon SW2, switches link coupling coils located upon each plate coil, thus allowing optimum adjustment of aerial coupling or loading for each band.

SW4, still another lever switch, having four poles, with two circuit and one off positions, is diagrammed at the upper centre

of Fig. 1. By means of this switch the aerial, which can best be a centre-fed half-wave doublet, is alternately connected to transmitter or receiver by operation of this switch knob, at the same time that plate power is transferred from transmitter to receiver and vice versa. In its third, or off, position, SW4 also breaks the filament circuit to turn off all power when batteries are used.

Through the aid of complete instruction booklet supplied by the maker of this kit, anyone at all can assemble, wire, test and operate it, for the only tools required are a small screwdriver, cutting pliers, a small soldering iron and a bit of resin-core solder, which latter is included in the kit along with a sufficiency of screws, nuts, lock-washers, soldering lugs and differently coloured (coded) hook-up wire. This simple, educational, and absorbingly interesting task completed in three or four hours, the builder has a complete amateur radio station upon addition of three valves, headphones and key and crystal.

**A FREQUENCY RECORDER***(Continued from page 293)*

on the former: the writer found that the best results were obtainable with "Quink."

As mentioned previously, the ultimate r.p.m. obtained in the reduction drive system used is 1.3 off load, but under load conditions this is desirably cut down to less than one turn per minute for the drum, consequently with the 2½ in. diameter former employed for the drum, which represents just over 8 in. in recording strip length, this timing proves quite convenient for general purposes.

The paper strips used for registering the graphs may either be glued on to the drum or cleated in one of the many ways which suggest themselves, each strip being previously ruled with fine tracking lines equidistantly spaced for the purpose of any measurements which the experimenter is desirous of making; an example is given in Fig. 3.

**Graph Types**

Referring now to these diagrams of graph types which are intentionally exaggerated for clarity, a good idea of the effects of different inputs can be readily seen.

"A" is typical of a passage of music in which frequency pitch is considerable.

"B" graph indicates a direct current impulse to the moving-coil, the peak "X" being the back thrust effect of the coil when restoring to a normal position.

The arrow shows the direction of drum rotation, the black spots at the tops of the graph indicating the inker.

In the case of "C," a D.C. impulse is depicted, maintained for a period of time "Y" which, when broken, brings about the same back thrust effect.

"D" strikes a familiar characteristic, and needs no enlargement, being typical of a pure sine waveform under ideal conditions.

For C.W. work this recorder not only proves useful as a means for infallible registering, but provides the amateur DX listener with a novel method for filling in QSL cards, suitable signal graphs being cut neatly into "telegraph type" strips and then glued to the card, thus providing the transmitter with a true speed and timing check.

The example given is for the letter "R" (—.), any other sequence being added with spacing taken from the end of the peak "X" to the commencement of the next word.

There is one other point to mention concerning the flexible coupling, and, referring to Figs. 1 and 2 once more, it will be seen that a short length of aluminium shafting "S" clamps in telescopic manner one of the coupling collars "C" to the shaft "P" which is of larger diameter, grub screws finally securing.

The action on the coupling by the push-pull movement of the moving-coil is depicted by the dotted lines.

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## ITEMS of INTEREST

### North Atlantic Air-Mail Service

THE Postmaster-General announces that air-mail correspondence for the United States of America, Canada, Newfoundland, and the Azores can now be accepted for transmission from Marseilles by the United States transatlantic air service.

The postage rates are 1s. 3d. per half-ounce (postcards 7d.) for the United States of America, Canada and Newfoundland, and 6d. per half-ounce (postcards 3d.) for the Azores. A blue air-mail label should be affixed to the top left-hand corner of the envelope, which should also be superscribed "North Atlantic Air Service."

The latest time of posting at the Head Post Office, London, E.C.1. for the first available service was 7.30 a.m. on Wednesday, the 31st of May, and correspondingly earlier elsewhere, and the aircraft was due to reach New York the following Saturday about noon. Correspondence for destinations in the United States of America beyond New York, and in Canada, will be forwarded from New York by air without additional charge.

The latest times of posting for subsequent services will be announced in the Post Office Daily List.

have already been demonstrated by these two ingenious experimenters. All experiments are with large-scale models, fulfilling all the functions of the real thing, and no crew or operator is required on board.

### Ediswan Farewell Party to Mr. A. Copelin

A FAREWELL supper was given to Mr. A. Copelin, Ediswan Lamp Works Stores Manager, whose fiftieth anniversary of service with Ediswan coincides with his retirement.

Mr. Copelin joined the company in 1889, and was first given work in the Photometer Department, of which he later took charge. Mr. Copelin, in a speech of thanks, recalled that in those days he began his day's work at 6 a.m., rising at 4.30 to make the tramp from Edmonton to Ponders End; there were no buses or trams to take him to and from work, and for those long hours of work he earned ten shillings a week. Mr. Copelin also recalled his association with Mr. W. H. Berry, of theatrical fame, who also started his business life at Ponders End under the same conditions, yet found time to organise the Black Swan Minstrel Troup!



Mr. Boyle (left) and  
Mr. Rieder experi-  
menting with their  
radio-controlled car  
at Cape Town.

### An Announcer's Home!

**ROGER BAKER**, heard on regular sports commentary programmes on WLW, recently moved into a brand-new house, perfect save in one detail—a careless plumber mislabelled the bathroom faucets. The cold water was marked hot, and vice versa. The first morning there, Baker dashed into the bathroom for a cold morning shower, and was nearly scalded to death!

### Controlled by Radio

A RADIO-CONTROLLED motor-car is one of the latest productions of Mr. H. J. R. Rieder, the Sea Point radio experimenter, and his partner, Mr. J. Boyle, a mechanical engineer, at Cape Town, South Africa. A radio-controlled warship and a hydroplane (speed-boat)

Mr. Berry was fired for shaving in the firm's time, and so a great actor went to the stage!

In 1889, Professor (now Sir Ambrose) Fleming was technical advisor to Ediswan, and not long after Captain Mullard began his career at Ponders End under Mr. Copelin; Mr. Belling, of Belling Lee, was also employed with Ediswan about that time. It is interesting to recall that Mr. Copelin engaged Mr. Le Marechal, who later left to become Manager of Messrs. Siemens' lamp factory at Preston.

Other interesting facts from a long string of reminiscences stored up over the 50 years during which the electric lamp has grown from little more than an embryo to what it is to-day, included work on the experimental vacuum flasks of Sir James Dewar, and the visual lamp on which Mr. Copelin did much of the groundwork.

# RADIO CLUBS & SOCIETIES

Club Reports should not exceed 200 words in length and should be received First Post each Monday morning for publication in the following week's issue.

Special Notice: Will club secretaries please send in reports in the form in which they appear on this page.

## SALE AND DISTRICT RADIO SOCIETY

Headquarters: St. Mary's School, Barkers Lane, Sale, Cheshire.

Secretary: S. C. O. Allen (2FCQ), 31, Emmerdale Drive, Sale.

Meetings: Weekly, at 7.30 p.m. on Thursday evenings.

"THE THEORY OF RADIO RECEIVERS" was the subject of a lecture by Mr. N. Postles at the last meeting. Mr. Postles dealt in detail with the design of a simple short-wave or broadcast set, and other lectures in the series will concern suitable equipment for building, stage by stage, a complete amateur short-wave transmitting station.

At each meeting periods are allocated for Morse tuition, and a general discussion of amateur radio matters.

As amateur transmitters in other districts have conducted experiments (in conjunction with the A.R.P. authorities) with a view to establishing an emergency communications service, the Society has offered to assist with any local A.R.P. scheme for which amateur radio would be officially recognised.

New members are welcomed. Subscription is 6d. per week. Entrance fee 1s.

## SLOUGH AND DISTRICT SHORT-WAVE CLUB

Headquarters: 35, High Street, Slough, Bucks.

Secretary: K. A. Sly, 2FAU, 16, Buckland Avenue, Slough.

Meetings: Alternate Thursdays at 7.30 p.m.

At the last meeting, held on May 25th, the usual Morse practice was preceded by a discussion on the teaching of Morse, in which Mr. Houchlin (G30Z) took a leading part.

A discussion on conditions followed, at the end of which it was decided to form a group to correlate meteorological conditions with the propagation of radio waves. Eight members agreed to co-operate in listening at set times.

Mr. Arnold was elected as vice-chairman, thus filling the vacancy made when Mr. K. A. Sly became the hon. secretary.

Mr. Gilbert (2DDG) kindly invited members to his QRA at 181, Stoke Poges Lane, Slough, for the next meeting to be held on Thursday, June 8th, commencing at 8 p.m. This meeting will be of an informal character. The following meeting will be held at headquarters as usual, on June 22nd.

## COXHOE AND DISTRICT AMATEUR RADIO SOCIETY

Temporary H.Q.: Slake Terrace Inn, West Cornforth, Co. Durham.

Joint Secretaries: D. F. Chaff, 23, North View, Sherburn Hill, Co. Durham; R. Bowes, 10, Blackgate, Coxhoe, Co. Durham.

Meetings: Temporarily, meetings are fortnightly, alternately on Mondays and Tuesdays.

The second general meeting was held on Monday, May 22nd, when 16 members were present (32 prospective members have been listed). Officers for the present temporary meetings were: Mr. J. Brown, president; secretaries, as above; Mr. Young, treasurer; committee, Messrs. Ayton, Bell, Jameson.

Suggestions for Radio and Physical Theory were discussed by Mr. L. Soulsby. Morse practice under Mr. A. Ayton was arranged, and a club receiver was left to Messrs. Bates and Henderson for construction.

Two members of the club have A.A. licences: Messrs. Bowes (2DTA) and Air (2FWX), and an ex-SU (Mr. Ayton) has also given support.

Further members will be welcomed, and full particulars may be obtained from either of the secretaries.

## ASHTON-UNDER-LYNE AND DISTRICT AMATEUR RADIO SOCIETY

Headquarters: Commercial Hotel, 86, Old Street, Ashton-under-Lyne.

Secretary: K. Gooding (G3PM), 7, Broadbent Avenue, Ashton-under-Lyne, Lancs.

Meetings: Fortnightly on Wednesdays.

On May 10th 15 members visited the *Daily Herald* Office at Manchester, and although unable to inspect the "Wired Picture" apparatus owing to a "technical hitch" developing at the last minute, spent a very enjoyable evening.

Work is going steadily ahead with the arrangements for the preliminary testing out on June 25th of the 56mc. Field Day gear. On May 23rd, G3BY inspected the proposed location (Hartshead Pike, about 900 feet above sea level) armed with ordnance map, compass, and telescope! Some good DX is forecast. Schedules are wanted with other 56mc. transmitting or listening stations, and interested amateurs are invited to communicate with the secretary, at 7, Broadbent Avenue, Ashton-under-Lyne, Lancs.

## BOOKS RECEIVED

**MEN WHO ARE SHAPING THE FUTURE.** By Edgar Middleton. Published by The Scientific Book Club. 238 pages. Price 2s. 6d. to members.

THE purpose of this book is to give details of the scientific achievement of democratic countries, and of Britain in particular. It is written by a journalist who specialises in science for other scientific amateurs, and the story is told in as simple and non-technical language as possible. The descriptions of the fine work of such men as Sir William Bragg, Sir Edward Mellarby, Julian Huxley, Prof. F. L. Hopwood, Sir James Jeans, Sir Arthur Keith, John Logie Baird, and S. M. Low, make interesting reading. The story of the discovery of insulin by F. G. Banting, and the account of Sir F. G. Hopkins' work in connection with vitamins are also included in this interesting volume.

## THE STATISTICAL YEAR BOOK

THE 1939 edition of the Statistical Year Book of the International Tin Research and Development Council, compiled by the Council's statistical office at The Hague, has just been published. From this Year Book one may trace the development of the world's tin industry from an output of about 8,000 long tons a year in 1800 to over 208,000 tons in 1937. The reduced demand in 1938 brought world output to 148,400 tons—nearly 29 per cent. lower than in 1937. The principal producers in 1938 were British Malaya, 43,247 tons, Bolivia, 25,371 tons and the Netherlands East Indies, 21,024 tons.

The book gives the tin production of all producing areas since 1800, covering not only the production of each country, but also in some cases the outputs of individual mining companies. For example, there are records over a period of 12 years for more than 100 companies operating in British Malaya. Production in the Belgian Congo has increased from only six tons in 1913 to 7,316 tons in 1938, and in Burma from 37 tons in 1890 to 3,990 tons in 1938. French Indo-China, the Argentine and Peru have also increased their outputs of tin in recent years, while Cornwall and Australia are producing less than formerly.

All the industries which consume tin are covered by the statistics, including tinsplate, canning, solder, bronze, collapsible tubes, the motor industry and the railways. The figures show that the number of motor vehicles in use throughout the world has doubled since 1924, reaching a record total of 42,677,948 in 1937.

The Year Book, which is fully illustrated by graphs, contains about 200 pages size 10½ in. by 8 in., and may be obtained from the International Tin Research and Development Council, Fraser Road, Greenford, Middlesex, England, at the price of 8s. per copy, post free.



His Grace the Duke of Somerset, D.S.O., O.B.E., will open the new transmitting stations of the B.B.C., at Start Point and Clevedon, on June 14th, 1939, at 3 p.m.

Mr. J. M. Rose-Troup, at present Assistant Director of B.B.C. Programme Administration, has been appointed Director of Programme Administration, in succession to Mr. R. J. F. Howgill, whose appointment as Assistant Controller (Administration) was recently announced. Mr. Rose-Troup joined the B.B.C. in 1925 and in 1926 became Station Director at Bournemouth, later transferring to London.

Mr. H. R. Cummings has joined the B.B.C. Overseas Intelligence Department, to carry out Public Relations duties in connection with the Corporation's broadcasts heard in foreign countries.

Sir Robert McLean has been appointed managing director of the Gramophone Company (H.M.V.) and the Columbia Graphophone Company. Sir Robert, who is already a director of the parent combine—Electric and Musical Industries, Ltd.—now becomes one of the leading figures in the radio and gramophone industry.

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# TELEVISIONS

## Television Exhibition in Lille

SOME time ago it was stated in France that two provincial television stations to supplement the Eiffel Tower transmission would soon be put in service at Lille and Lyons. Apparently a restriction of Government expenditure on a basis resembling that which exists in this country has caused these ambitious projects to be modified. Fortunately, an exhibition is to be opened shortly in Lille, and since this is to run for six months, the exhibition authorities have made arrangements for a high-definition television transmission to become operative during the period of the exhibition. A large-screen equipment is to be demonstrated, and if the radiated signals are of good quality it is hoped that receiving sets will be sold and so build up a viewing public which will justify the Ministry of P.T.T. in going ahead with its original scheme. The other European television service, that is the one to be provided by Germany, is still in abeyance, although signals were scheduled to be on the air towards the end of last year. It is stated that the reason for the delay is not financial but political, since the engineers of the Reichspost are busily engaged on other duties. In spite of this, the German manufacturers have made plans for marketing their sets and it is hoped that the initiation of the service will find the industry well able to cope with orders from stock, and so avoid the situation which happened recently here where deliveries of sets were several weeks behind the receipt of a customer's order.

## Tilt Distortion

DURING the course of the discussion following the I.E.E. paper describing the Emitron camera a short time ago, repeated reference was made to forms of distortion all of which arose from the well-known "tilt" effect present in the device and which, as far as possible, is reduced by suitable correction devices in the chain of equipment from camera to radio transmitter. For example, the case was quoted where with some objects having large black areas at the bottom an intense white edging appears. Then it sometimes occurs that there is a black overshoot from a white area on a dark background and vice versa; while yet another effect sometimes noticed is a darkening of the top part of the picture to a depth of 10 per cent. or more. It was explained, subsequently, that spurious tilt signals depend on a number of factors, such as small stray magnetic fields, type of mosaic signal plate surface, illumination distribution, etc. When there is a white edging which obtrudes into large black areas this can be reduced by increasing the degree of lighting if it is a studio transmission, as then reduced amplification can be employed in the head amplifier. When there is a streaking effect in the picture this is due to the scanning spot remaining on, say, a white band for a comparatively long time, and so making the peak potential drift more positive. When a dark section is reached the potential change is slow and this gives the streaking effect complained about. In the case of the black band which sometimes makes an appearance at the top of the picture, this is brought about as a result of the strong black pulse which occurs at the beginning of each frame. When the scanning beam of electrons in the camera begins a new frame it is surrounded by a region of the mosaic which is

at a more negative potential than normal, with the result that the secondary electrons liberated by the electron beam impact tend to return to the collecting anode in numbers excess of the usual. In the majority of cases this edge effect is suppressed in the amplifiers, but when conditions are not favourable it can extend right into the picture.

## Big-screen Installations

THE big-screen installations in the Gaumont-British cinema circuit are now proceeding apace. The Marble Arch Pavilion and Tatler were completed some



Wilson E. Burgess, amateur radio operator of Westerly, Rhode Island, has been selected by a board of five distinguished judges for the William S. Paley Amateur Radio Award for 1939. He is pictured above in his station, W1BDS. Selection of Burgess for the award was based on his heroic performance during the hurricane which devastated large sections of New England. When power was wrecked, he established the only communication source Westerly had with the outside world, rigging up temporary antenna and keeping his feeble battery-operated transmitter working at great personal risk. For 46 hours he handled all rescue messages to and from Red Cross national headquarters, bringing relief to the stricken community, notified relatives of the dead, and carried reassuring messages for survivors.

time ago, and it is now announced that the following are at present being equipped with 15ft. by 12ft. screens, and the appropriate twin projector receivers: New Gallery, Tivoli, Dominion, New Victoria, Gaumont Haymarket, and the Gaumont Palaces at Chelsea, Hammer-smith, Lewisham, Streatham and Camden Town. The Baird Company are carrying out the work at high speed, and it is possible that the next rediffused national event radiated from Alexandra Palace will see most of these cinemas in operation; this providing a public viewing audience of over 25,000 people. It is quite natural that exhibitors will want to see how the public respond to this sudden multiplication

of facilities. One thing is certain, the greatest appeal will come from news events, but this alone is sufficient to justify the cost involved for installation.

Recent progress in this side of television's work has been so rapid, and spectacular, that it tends to overshadow the vast increase in home receiver sales which manufacturers report, but the two aspects combined leave no doubt that every section of the community within the signal service area is being made television conscious, and the industry as a whole cannot fail to benefit.

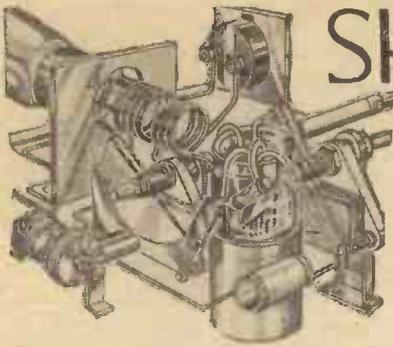
## The Artist's New Outlook

QUITE apart from solo acting in a television studio, the stage artist, whether engaged in a dramatic or humorous rôle, is rapidly falling into a new technique insofar as his or her characterisations are concerned. With the promise of service extensions, with its natural corollary of increased programme hours, there are many authorities who have gone so far as to say that television will eventually affect an actor's whole value in his relation to the living audience. This will arise quite naturally from the circumscribed limits imposed on both voice and movement when acting in front of a modern television camera. Many theatrical and music-hall managers are beginning to show a very creditable broad-mindedness in permitting television to "invade" theatres and music-halls, and it is very apparent that all the parties must surely benefit by this mutual regard for the newest form of entertainment. At the outset it is quite natural that some of the artists may have the feeling that they will suffer, but the history of progress in every new art shows clearly and definitely that this is never the case. It is only necessary to adjust one's activities to suit modern developments, and while spirited opposition has and no doubt will continue for a time to delay matters, it will not prevent ultimate fruition. It is better, therefore, to examine the position in the early stages, and at once remove any suggestions of hardships or unfairness, than wait for the day when television is too well established to merit any remoulding of ideas.

## PRACTICAL MECHANICS HANDBOOK

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# SHORT-WAVE SECTION

## AN EXPERIMENTAL THREE-VALVE

This Article Describes in Detail the Construction of a Four-wave-band Three-valve Experimental Receiver Designed Around a Pair of Lissen Sky-scraper Type Four-wave-band Switched Coils.

SHORT-WAVE experimenters as a rule prefer receivers which have been specially designed for short-wave reception, and which by means of interchangeable plug-in coils cover both amateur and short-wave bands without a break.

There are, however, some who favour the popular type of four-wave-band receiver in which quadruple wave-band tuners are incorporated, and in which the wave-changing is carried out by means of integral switching mechanism.

In the receiver to be described, apart from the coils specified, the experimenter may use components to hand, provided

used. It will be noted that the coupling condenser between the plate of the S.G. valve and terminal No. 4, Fig. 1, is of .0001 mfd. capacity, and of the pre-set or semi-variable type, and that individual tuning condensers are used in the case of the tuned circuits as distinct from ganged condensers, whilst the reaction condenser is of .0003 mfd. capacity. Reference will be made later to band-spread arrangements.

### Coil Particulars

The specified coils are fitted with a four-range switch mechanism, and cover the following ranges:

- S.1. = 12 to 28 metres
  - S.2. = 26 to 90 metres
  - M. = 175 to 200 metres
  - L. = 700 to 2,000 metres
- (Tuning capacity .0005 mfd.)

The H.F. chokes used must therefore be of the all-wave type, and capable of functioning efficiently throughout the full tuning range of the receiver without peaking. The writer used the Graham Farish screened type. If a binocular type choke is to hand, and of suitable design as to efficient chocking range, this should be used in the H.F. stage.

### Coupling Condenser

Reverting to the pre-set coupling condenser. A fixed condenser can be used in this position, but the .0001 mfd. enables the operator to obtain efficient coupling between the two stages, and will be found very effective as an aid to smooth operation on the lowest range. In addition, it is an effective means of improving selectivity on the broadcast and S.W. bands, if used with discretion.

During experiments, various grid leak and associated condenser values and combinations of values were tried, and the same applies to decoupling, by-pass condensers, and grid-stopper resistances.

The values as specified, however, proved to be the most satisfactory individually, and collectively, and complete freedom from any adverse effects is the result.

Where a power valve is used in the L.F. stage a 3 to 1 ratio L.F. transformer is

advised. If, however, a pentode is to be used, and a 7 to 1 transformer is to hand, by all means use it.

With reference to the plate lead of the S.G. valve, this should be screened, and the screening earthed.

### Panel and Chassis Lay-out

Fig. 2 shows the panel and chassis assembly, which consists of a 20-gauge aluminium panel and chassis of plywood, lined on the underside with copper foil.

The panel brackets may be of aluminium or of wood trenched into the chassis ends as shown, but in any case should have feet at least 3ins. wide in order to assure a rigid assembly. The disposition of the various controls are shown, together with the chassis and panel dimensions.

Fig. 3 shows the component lay-out which allows all leads to be kept comparatively short and direct. Earth return points are taken direct to the mooring bolts designated M.B. These should make sound mechanical and electrical contact with the copper foil on the underside of the chassis, which in turn is earthed via the earth terminal.

The coil screens and also H.F. choke screens should also be earthed to the chassis, the tuning condensers having their moving plates automatically earthed by direct contact with the panel. The panel should be effectively bonded to the chassis foil in the interests of stability.

### Band-spreading

With reference to band-spreading, it will be noted that this is only applied to the detector stage. As the H.F. stage tunes sufficiently broad enough to cause the small increase in capacity to have the minimum of effect, so far as tracking is concerned, it was considered unnecessary to band-spread both stages. The specified capacity provides a spread of 50 degrees on the 40-metres band, and makes tuning much easier.

Experimenters who have a mechanical band-spread type twin-pointer dial to hand, may, of course, use it, whilst others who prefer a smaller condenser capacity, simply to provide a vernier effect, may do likewise.

A few general comments may be of interest. First, concerning the fact that the experiments outlined were undertaken to find out exactly how the coils to hand

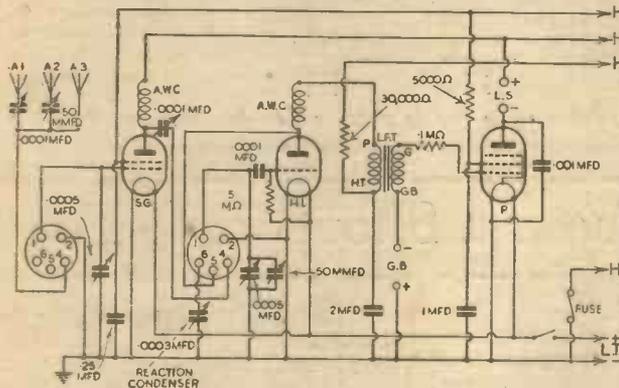


Fig. 1.—Theoretical circuit of a 4-band experimental receiver.

that they are of suitable types, and to specified values.

Having the specified coils to hand, together with data concerning the relations and dispositions of the various windings, the writer had to devise a suitable circuit in which to incorporate them as a preliminary to practical experiments.

Then followed a series of practical experiments, in which various additions and modifications were carried out, in order to achieve an acceptable standard of overall efficiency throughout the full tuning range of the coils used.

### The Circuit

The final circuit is shown in Fig. 1. This consists of a single stage of S.G. high frequency tuned by a .0005 mfd. tuning condenser, followed by a triode detector, also tuned with a condenser of equal capacity, the final stage being transformer coupled L.F. suitable for power or pentode valve output. This forms a simple but efficient combination.

Before going further I think it best to discuss the various features in detail. It will be noted that three separate aerial inputs are incorporated and designated as A.1, A.2, and A.3 respectively. The reason for this arrangement is because the writer realises that short-wave aerials as used by experimenters differ as to type, length and height, no two, as it were, being alike, whilst in some instances indoor aerials of comparatively low efficiency, due to the damping of the down lead, are

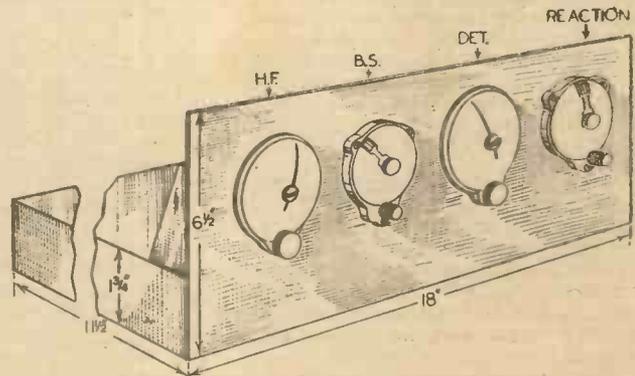


Fig. 2.—How the panel and chassis should be arranged, with full dimensions.

would perform in a simple straightforward circuit. Using pentode output, a considerable number of European transmissions are receivable at loudspeaker strength on the medium, long, and short waves, which compares very favourably with average dual-purpose receiver performance.

(Continued overleaf)





# LETTERS FROM READERS

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

## A Car-radio Set!

SIR,—Your correspondent, W. G. R. Bowden, is probably right. I, for one, have been waiting and hoping for a very long time for a constructive article on car-radio.

Mr. Bowden's suggestions seem good enough for me, with just one exception. I would like to see the set to be described run entirely from the car battery. This should not be impossible nor difficult.

I distinctly dislike the idea of a separate H.T. supply, and, in any case, why add worry to motoring?

Thanking you, and wishing your excellent paper every success.—D. A. BLYTH (Westminster).

## Exchanging QSL Cards

SIR,—I saw in a recent issue of your paper an offer to exchange QSL cards. I would be glad to exchange cards with any "full ticket," "A.A." hams or any BR5 or SW4 station in Great Britain or elsewhere. All will be acknowledged by return of post.

I have been a reader of PRACTICAL AND AMATEUR WIRELESS for many years now, and would like to offer my congratulations to such a fine weekly.—J. C. HISLOP (Linkfield, Lamnah, Isle of Arran, Scotland).

## Station VS7RA (Ceylon)

SIR,—May I point out a slight error which I made in my letter published in the May 20th issue of PRACTICAL AND AMATEUR WIRELESS? The letter was headed "Station VS2RA," and in the letter reference was again made to VS2RA. This should read VS7RA of Ceylon. The British call sign was correctly given as G5RA.—GERALD R. W. LEWIS (Cheltenham).

## A Tuning Fault

SIR,—A curious complaint was recently brought to my notice. It was stated that a receiver, an all-mains H.F.-Det.-Pen., would not receive London Regional.

Accordingly, I tried the set for myself. It would not! At 7 p.m. Strasbourg, Milan, Poste Parisien and all stations in the neighbourhood were there, but not London Regional. I could obtain anode current at all valves, and oscillation at all points on the dial; and I could receive London Regional at full strength on all other receivers in the house. An explanation of the cause would be most welcome.—R. W. LYNE (Eastbourne).

[The most likely explanation of a peculiarity of this nature would be a short-circuit across the tuning condenser, due to a bent cane which only shorted in the position of tuning of the London station. Perhaps readers may have some alternative solution to offer for such an unusual fault in an otherwise perfect receiver.—ED.]

## Correspondents Wanted

SIR,—I have been a very keen reader of your excellent paper for several months, and find it very helpful to beginners in radio like myself.

I should be very pleased if any of your readers would correspond with me, preferably residing in India or Egypt.

I shall also be very glad to exchange my S.W.L. card with anyone interested, either at home or overseas.—A. K. GREAVES (296, Hollins Road, Oldham, Lancs).

SIR,—I should be very pleased to correspond with any S.W. enthusiast at home or abroad, with a view to exchanging S.W.L. cards. Wishing your fine paper every success.—S. C. MENZIES (174, Peckham Rye, East Dulwich).

SIR,—I have been a reader of PRACTICAL AND AMATEUR WIRELESS for four years and I am very pleased with the articles appearing therein. I shall be glad if you could put me in touch with any other young reader living in this country or abroad who is interested in short-wave

## CUT THIS OUT EACH WEEK

# Do you know

—THAT temperature can affect the tuning of a circuit, and therefore care should be taken in placing coils in a mains receiver.

—THAT it is sometimes desirable to earth a chassis, but not to connect "earth" points in the circuit to the chassis.

—THAT it is not essential to use the mains section of a receiver for energising a speaker and a separate mains unit may be used for this purpose.

—THAT for short-wave work a resistance-controlled reaction circuit is more reliable than the usual condenser scheme.

—THAT high-gain pentodes are not always preferable for a detector stage, but when working properly give increased gain.

—THAT the value of the grid-leak often has a marked effect on the smoothness of the reaction control.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, George Nevenes, Ltd., Touce House, Southampton Street, Strand, W.C.2.

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reception and transmission.—L. SANDERS (2HCA) (39, Stowell Road, Kingstanding, Birmingham, 23).

## A 20m. Log from Hendon

SIR,—For over a year I have been a regular reader of PRACTICAL AND AMATEUR WIRELESS, and its pages have been the source of most of my radio knowledge. I follow other readers' logs with much interest and I submit a selection of 20m. amateurs I have logged here during the past week.

W5ZS; W60CH, 1DY; W7IUB, BVO; VP6YB; K4EGF; C08BC; VP3CO; CX2CO; CE3AC; PY, JR, 1MH, 2HV, 2QB, 3BH, 3EN, 4CB, 4AU; LU2HF, 3HA, 5CK; 8AB; YV1AQ, 2CB, 4RA, 5QK; FA8CF; SUIMW, IMM; K6NYD; PK4JA, and VU2FA. My receiver is a 0-V-1 with 'phones, and the antenna is a 30ft. inverted-L, 20ft. high. I would like to correspond with a short-wave listener abroad (except Europe) with a view to exchanging 20m. logs and information on S.W. reception.—L. COLLOR (31, Albert Road, Hendon, N.W.4).

## I.E.E. NOMINATIONS

THE Committee of the Wireless Section of the Institution of Electrical Engineers make the following nominations to fill the vacancies which will occur on the Committee on September 30th, 1939:—

Chairman: E. B. Moullin, M.A., Member (Oxford University).

Vice-Chairman: Dr. R. L. Smith-Rose, Member (National Physical Laboratory).

Ordinary Members of Committee (three vacancies): W. L. McPherson, B.Sc. (Eng.), Member (Standard Telephones and Cables, Ltd.); J. A. Ratcliffe, M.A., Associate Member (Cambridge University); M. G. Scroggie, B.Sc., Associate Member (Consulting Radio Engineer).

Not later than fourteen days after the publication of the Committee's list of nominations, any five (but not more than five) members of the Wireless Section, being Members or Associate Members of the Institution, may nominate any other duly qualified person as Chairman, Vice-Chairman, or Ordinary Member by delivering such nomination in writing to the Secretary, together with the written consent of such person to accept office if elected, but each such nominator shall be debarred from nominating any other person for the same election.

The Committee of the Section for the present session is as follows:—

Chairman: \* A. J. Gill, B.Sc. (Eng.).

Vice-Chairman: \* H. Bishop, C.B.E., B.Sc. (Eng.).

Immediate Past Chairman: \* T. Wadsworth, M.Sc.

Ordinary Members of Committee: \* W. J. Brown, B.Sc.; R. P. G. Denman, M.A.; T. E. Goldup; A. J. A. Gracie, B.Sc.; H. L. Kirke, G. S. C. Lucas; J. S. McPetrie, B.Sc., Ph.D.; \*E. B. Moullin, M.A.; Col. G. D. Ozanne, M.C.; W. J. Picken; \* S. B. Smith; R. T. B. Wynn, M.A.

Representatives of Government Departments: Col. R. Elsdale, O.B.E., M.C., M.A., nominated by War Office; Capt. P. F. Glover, R.N., nominated by Admiralty; N. F. S. Hecht, nominated by Air Ministry; A. H. Mumford, B.Sc. (Eng.), nominated by Post Office.

Together with the following ex-officio members: The President, I.E.E.; The Chairman, I.E.E. Papers Committee; J. R. Beard, M.Sc. (Council Representative).

\* Retires on September 30th, 1939.

# LATEST PATENT NEWS

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume or in bound volumes price 2s. each.

**Abstracts Published.**

**LOUDSPEAKERS.**—Murphy Radio, Ltd., and Brayshaw, G. S. No. 496487.

In a loudspeaker having a diaphragm 1 (Fig. 1) mounted in one wall of a cabinet 2, a tube 3 coaxial with the diaphragm and of

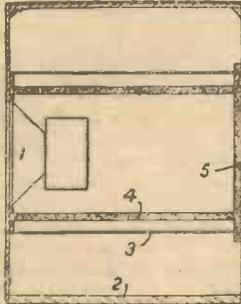


Fig. 1.

is closed by a pad 5 of sound-absorbent material. Specification 483,745 is referred to.

**LOUDSPEAKERS.**—Parfit, A. W. (Trans-laphon Corporation). No. 496127.

A loudspeaker 5 (Fig. 2) is suspended from the motor-board 9 of a gramophone in a compartment lined on four sides with one or more layers of cotton batting 14. The back opening 11 is covered by a screen 12 and cloth 13 in usual manner. Openings 25 are also formed in the motor-board and are covered with cloth 26.

**LOUDSPEAKERS.**—Naamlooze Vennoot-

schap Philips' Gloeilampenfabrieken. No. 495240.

A loudspeaker having a conical diaphragm has two or more non-parallel partitions, placed partially within the cone and diverging in the same direction as the

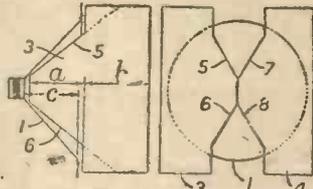


Fig. 3.

Fig. 4.

cone, extending from the vicinity of the cone for a distance between 1.5 and 3 times the height of the cone. The partitions 3, 4, Fig. 3, are of the shape shown in front elevation and extend at an angle to each other into the cone 1 so that their edges 5, 6, 7, 8 lie close to its surface, Fig. 4, and do not quite touch the cone when the latter is vibrating at maximum amplitude. The length *b* extending beyond the cone is approximately equal to the part *a* within it and both together are at least twice its height *c*. The two partitions need not actually meet and the parts extending outside the cone may be formed separate from the inner portions.

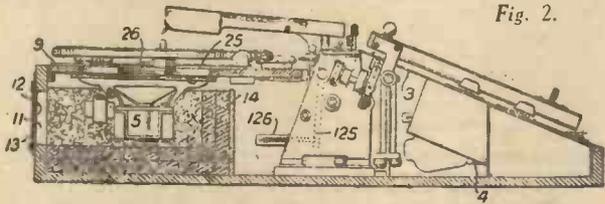


Fig. 2.

## Television Features

### MURDER ON THE SECOND FLOOR

**F**RANK VOSPER'S thriller, "Murder on the Second Floor," will be televised on the evening of June 10th and the afternoon of June 20th. Production will be by Stephen Harrison.

This thriller is really a play within a play. It opens by portraying the characters of a boarding-house, one of whom is a young author, Hugh Bromilow. He is in love with Sylvia Armitage, the landlady's daughter, who is most anxious that he should be a real author and write a thrilling play around living characters—say, the people of the boarding-house. Hugh accepts the challenge and there and then outlines a thriller embracing the members of the household—the maid, a commercial traveller, Sylvia's mother and father, a maiden lady, and an Indian student. As Hugh discloses the plot, it is enacted to the viewing audience. This includes a suicide and a murder, but a twist brings the play to a happy ending.

### TROOPING THE COLOUR

**T**ROOPING THE COLOUR on the Horse Guards Parade will be televised for the second time on the morning of June 8th. The televising of this—one of the most impressive of the year's ceremonial events—was an outstanding success last year and viewers who saw it will no doubt remember the very fine pictures obtained, including a view of the Guards' Memorial.

Two Super-Emitron cameras on the roof of the Horse Guards building will give views of the entire parade, while a third camera near the Whitehall entrance of the Parade Ground will give intimate glimpses of the Duke of Gloucester, who, as the troops wheel past, will be taking the salute in the absence of the King.

A commentary will be given specially for viewers.

### WESTERN CABARET No. 3

**T**HE setting of the third of Harry Pringle's Western Cabaret programmes will be a "shindig," which is an American expression for a camp fire concert. On June 13th and 17th the visitors will be tenderfoot Claude Dampier and Billy Carlyle. Claude will appear in the nearest approach to Western garb as is possible, and his dog will be seen with him. It will be the dog's first appearance in television programmes, and it is said that if he doesn't approve of his master's act he yawns rather blatantly.

The visitors will be in the usual jovial company of Harry Lester and his Hayseeds, in their comedy act; the Three Van Strattans, who are making their first appearance for viewers in their whip-cracking and rope-spinning act; Larry Adamson, a yodelling cowboy (another newcomer to television); and Buck Douglas, well-known to viewers for his Texas monologues. Genial Big Bill Campbell will compère the show.

Western Cabaret will be televised in the evening on June 13th and repeated in the afternoon programme on June 17th.

## NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents and are published by permission of the Controller of H.M. Stationery Office and the Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. weekly (annual subscription £2 10s.).

### Latest Patent Applications

- 13657.—Baird Television, Ltd., and Baird, J. L.—Apparatus for the presentation of stereoscopic images to a plurality of observers. May 8.
- 13658.—Baird Television, Ltd., and Baird, J. L.—Stereoscopic kinematograph cameras. May 8.
- 13518.—Calvert, R.—Thermionic valve circuits, etc. May 5.
- 13593.—Cole, Ltd., E. K., and Martin, A. W.—Combined short-wave radio transmitting and receiving apparatus, etc. May 6.
- 13807.—Cossor, Ltd., A. C., and Jofeh, L.—Electric circuits, etc. May 9.
- 13692.—Grunwald, H., and Barsch, S.—Wireless apparatus. May 8.
- 13745.—Magyar Wolframlamp Gyar Kremenezky Janos R. T.—Methods, etc., for eliminating interference in radio reception. May 8.
- 13401-13402.—Philips Lamps, Ltd.—Television transmitters. May 4.
- 13766.—Philips Lamps, Ltd.—Super-heterodyne wireless receiving sets. May 8.
- 13603.—Radioakt.-Ges. D. S. Loewe.—Methods, etc., for the televising of kinematograph films. May 6.

- 13698.—Telefunken Ges. fur Drahtlose Telegraphie.—Tuning of wireless receivers. May 8.
- 13920.—White, E. L. C.—Thermionic valve circuit arrangements. May 10.

### Specifications Published

- 505170.—Beatty, W. A.—Wireless apparatus.
- 505079.—Blumlein, A. D.—Wireless transmission of receiving apparatus.
- 505036.—Marconi's Wireless Telegraph Co., Ltd., and Parkin, T. D.—Tuning arrangements for radio transmitters.
- 505197.—Baird Television, Ltd., Dovaston, G., and Graham, G. E. G.—Television and like systems.
- 504960.—Ferranti, Ltd., Searby, N. H., and Thomas, G. I.—Audio-frequency thermionic amplifiers.
- 505057.—Compagnie Pour la Fabrication des Compteurs et Material D'Usines a Gaz.—Television or telecinema transmitters.
- 504866.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Supply arrangements for radio-receiving sets.
- 505167.—Radioakt.-Ges. D. S. Loewe.—Television transmission. (Divided out of 503207.)

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.

**THE WIRELESS CONSTRUCTOR'S ENCYCLOPÆDIA**

By F. J. CAMM (Editor of "Practical and Amateur Wireless") 6th Edition 5/- net

Wireless Construction. Terms, and Definitions explained and illustrated in concise, clear language.

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# QUERIES and ENQUIRIES

theoretical sketch and indicate the separate currents you will not find it very difficult to arrive at the appropriate values.

## Transmitting Licence

"I am keen to get a transmitting licence, and in past issues I have read the details you have given. I only wish to experiment with telephony apparatus, and I wonder if it is necessary in this case to pass the Morse test. I want to build a one-valver, for economy purposes, and naturally would have to use separate modulator, but I do not wish to transmit Morse. What is the exact position?"—L. E. D. (N.W.8).

ALTHOUGH you may not intend to transmit C.W. signals, you must still pass the Morse test before you can obtain your licence. This qualification is necessary under International Regulations, and the operator of a station must be in a position to act upon instructions in Morse which may be issued by a Government or commercial station. A charge of 5s. is made for the Morse examination and is additional to the normal licence fee.

## Earth Bonding

"I have noted several points regarding the efficiency and method of carrying out earth connections in modern receivers, but there is just one point about which I am doubtful. I wish to use an aluminium chassis and most components will be bolted down. Is it preferable to use the nearest bolt as an earth point, or to make only one or two bolts earth connections and run leads to the nearest of these?"—L. W. de A. (Barnsley).

IN some cases it may be quite in order to use the nearest bolt as the earthing point. In others, especially where two H.F. stages are in use, it may be preferable to use only one bolt for each stage, and to take all earthing leads to the common bolt by the most direct route. It may also be found desirable in some cases to link up all such earthing points by heavy gauge wire.

## Potential Dividers

"I have noted that in some circuits, especially where S.G. or pentode valves are used, potential dividing circuits are adopted for H.T. voltage supplies. This scheme is also used in some receivers for obtaining all of the H.T. voltages in the circuit. How does one work out the appropriate values of the separate sections of such a device? I find this very confusing?"—P. E. R. (Limerick).

IN the first case the total current flowing through the potential divider must be calculated according to the value of the total resistance and the H.T. across it. Then the current flowing through each "arm" of the device must be calculated according to the valve or electrode which is being fed from it. Then, in some parts of the divider you will see that there is the sum of two or more currents flowing, and by Ohm's Law it is usually possible to work out the voltage drop. The process is not exactly simple, but if you make a

## Mains Hum

"I appear to be getting a form of modulated mains ripple which so far I have been unable to overcome. I have tried condensers across rectifier and from various secondaries to earth, but am not certain whether it is desirable to place them also across the primary, and if so, what values should be used in view of the fact that the

### RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporaries.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.
- (5) Grant interviews to querists.

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.

Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

primary is direct across the mains. Could you give me any assistance in this direction?"—D. C. (Renfrew).

IT is quite in order to use condensers in the primary circuit and there are two methods which are generally adopted. In some cases a single condenser from earth to one side of the primary may prove all that is necessary, whilst in other cases you may find it desirable to use two condensers, one from each side of the primary to earth. A value of .01 mfd. generally proves satisfactory. The condensers should be of the 400-volt working type.

## Testing An Eliminator

"I have built an eliminator from parts that have been tested and found O.K., but where I should get 150 volts max. I get 240 max., and where I should have 100 volts (No. 2) I get 200 volts. Could you tell me where I have made a mistake? The mains I tested it from were 250 D.C. The eliminator is, of course, D.C." (A sketch was enclosed).—E. T. (Twickenham).

THE circuit which you sent shows that the circuit is perfectly in order, but the maximum H.T. positive line contains only the smoothing choke. Unless a fairly large current flows through this there will not be 100 volts drop, which is necessary to reduce the 250 volts mains supply to 150 volts. On the other hand, the potential divider and series resistance for the other tapping should give the low voltage with a small current, but we imagine that you

tested the unit without a load. To test a unit of this type, the receiver should be connected and a high-resistance voltmeter must be used for the testing.

## Transverse Current Mike

"With reference to the 'Transverse Current Microphone' described in your issue No. 348, where could I obtain the mica diaphragm, and what would be its approximate cost?"—G. F. K. (Charnford, Leicester).

THE diaphragm may be obtained, together with the remaining parts for this microphone, from T. W. Thompson, 176, Greenwich High Road, Greenwich. The diaphragm costs 6d., and a complete set of parts needed, including the carbon granules, costs 7s. 6d.

## Field Strength Indicator

"I wish to make several pieces of apparatus for inclusion in my amateur station which I am building, so that when I get my transmitting licence I shall have a properly equipped shack. I have got a number of interesting details, but would like to know the simplest form of field strength indicator which could be made compact and neat. Have you described such a piece of apparatus, or could you give any details for this?"—L. D. (Harrow).

A STANDARD plug-in coil for the wavelength covered, with a diode or other valve coupled to a standard low-reading meter, would be quite suitable, but we have not described such a piece of apparatus although we hope to do so in due course. You can use an ordinary triode connected as a diode, a standard single diode, or a double-diode with anodes strapped, and the meter should, of course, give a total reading consistent with the particular valve in use.

### REPLIES IN BRIEF

The following replies to queries are given in abbreviated form either because of non-compliance with our rules, or because the point raised is not of general interest.

B. P. (Enfield). It is certainly possible to carry out the idea you mention and Messrs. Percival Marshall can supply an interesting book dealing with the subject. No licence is necessary, but spark apparatus cannot be employed.

P. J. H. (Clonakilty). We have no details of your particular local conditions, but the set should certainly give the stations you mention. All parts are obtainable from Messrs. Peto-Scott.

A. D. (Edinburgh). We regret that we have no blueprints or other constructional data of set with the type of coil mentioned.

A. W. (E.9). The best plan is to fit a 250,000 ohms volume control across the transformer secondary, connecting the grid of the valve to the arm of the potentiometer instead of to the transformer.

J. H. (Carlisle). We certainly advise the dipole aerial. Use the 18 twist for lead-in.

W. McC. (Letterkenny). We cannot supply further details at the moment but may publish an article on the subject in the near future.

S. R. H. (Lostock, nr. Bolton). A roof aerial will undoubtedly prove most effective. The low aerial is bound to produce the effects you have noticed and should be removed and substituted either by the "fish-pole" alone or the roof device.

P. H. M. (S.E.23). The blueprint has been withdrawn as the receiver is quite out of date for modern conditions. We regret that we have no details which we could supply.

The coupon on page 303 must be attached to every query.

# Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS	No. of	
CRYSTAL SETS.	Date of Issue.	Blueprint.
Blueprints, 6d. each.		
1927 Crystal Receiver	—	PW71
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<b>STRAIGHT SETS. Battery Operated.</b>		
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F. J. Camm's Silver Souvenir (HF Pen, D Pen, Pen) (All-Wave Three)	13.4.35	PW49
Genet Midget (D, 2 LF Trans)	June '35	PM1
Cameo Midget Three (D, 2 LF Trans)	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	—	PW53
Battery All-Wave Three (D, 2 LF RC)	—	PW55
The Monitor (HF Pen, D, Pen)	—	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P)	14.8.37	PW64
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW60
The "Colt" All-Wave Three (D 2 LF RC & Trans)	18.2.30	PW72
The "Rapid" Straight 3 (D, 2 LF RC & Trans)	4.12.37	PW82
F. J. Camm's Oracle All-Wave Three (HF, Det., Pen)	28.8.37	PW78
1938 "Tri-band" All-Wave Three (HF Pen, D, Pen)	22.1.38	PW84
F. J. Camm's "Sprite" Three (HF Pen, D, Tet)	26.3.38	PW87
The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	30.4.38	PW89
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet)	3.9.38	PW92
<b>Four-valve : Blueprints, 1s. each.</b>		
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Fury Four (2 SG, D, Pen)	8.5.37	PW11
Beta Universal Four (SG, D, LF, Cl. B)	—	PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	—	PW46
F. J. Camm's "Liuist" All-Wave Four (HF Pen, D, LF, P)	26.9.33	PW67
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"Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B)	12.2.38	PW83
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D.C. Ace (SG, D, Pen)	—	PW25
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A.C. Leader (HF Pen, D, Pow)	7.1.39	PW35B
D.C. Fronier (HF Pen, D, Pen)	21.3.34	PW35C
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	—	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF RC)	—	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	—	PW56
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70
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A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37	PW45
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47
A.C. All-Wave Corona Four	6.11.37	PW81

SUPERHETS.		
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Experimenter's Short-wave Three (SG, D, Pow)	30.7.38	PW30A
The Perfect 3 (D, 2 LF RC and Trans)	7.8.37	PW63
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<b>PORTABLES.</b>		
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The H.K. Four (SG, SG, D, Pen)	Mar. '35	WM384
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The index letters which precede the Blueprint Number indicate the periodical in which the description appears: Thus P.W. refers to PRACTICAL WIRELESS, A.W. to Amateur Wireless, P.M. to Practical Mechanics, W.M. to Wireless Magazine.

Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable) to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

Mains Operated.		
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Home Lover's New All-electric Three (SG, D, Trans) A.C.	—	AW383
Mantovant A.C. Three (HF Pen, D, Pen)	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	Jan. '36	WM401
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SUPERHETS.		
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SHORT-WAVE SETS—Battery Operated.		
<b>One-valve : Blueprints 1s. each.</b>		
S.W. One-valver for America	15.10.38	AW429
Rome Short-waver	—	AW452
<b>Two-valve : Blueprints, 1s. each.</b>		
Ultra-short Battery Two (SG det, Pen)	Feb. '36	WM402
Home-made Coil Two (D, Pen)	—	AW449
<b>Three-valve : Blueprints, 1s. each.</b>		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34	AW488
The Carrier Short-waver (SG, D, P)	July '35	WM390
<b>Four-valve : Blueprints, 1s. 6d. each.</b>		
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Empire Short-waver (SG, D, RC, Trans)	—	WM313
Standard Four-valver Short-waver (SG, D, LF, P)	Mar. '35	WM333
Superhet : Blueprint, 1s. 6d.	—	—
Simplified Short-wave Super	Nov. '35	WM397

Mains Operated.		
<b>Two-valve : Blueprints, 1s. each.</b>		
Two-valve Mains Short-waver (D, Pen) A.C.	—	AW453
"W.M." Long-wave Converter	—	WM380
<b>Three-valve : Blueprint, 1s.</b>		
Emigrator (SG, D, Pen) A.C.	—	WM352
<b>Four-valve : Blueprint, 1s. 6d.</b>		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	Aug. '35	WM391

MISCELLANEOUS.		
S.W. One-valve Converter (Price 6d.)	—	AW320
Enthusiast's Power Amplifier (1/6)	—	WM337
Listner's 5-watt A.C. Amplifier (1/6)	—	WM392
Radio Unit (2v.) for WM392 (1/-)	Nov. '35	WM398
Harris Electrogram, battery amplifier (1/-)	—	WM399
De Luxe Concert A.C. Electrogram (1/-)	Mar. '36	WM403
New Style Short-wave Adapter (1/-)	—	WM388
Trickle Charger (6d.)	Jan. 5, '35	AW462
Short-wave Adapter (1/-)	—	AW456
Superhet Converter (1/-)	—	AW457
B.I.D.L.C. Short-wave Converter (1/-)	—	—
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The W.M. A.C. Short-wave Converter (1/-)	June '36	WM403
—	—	WM404

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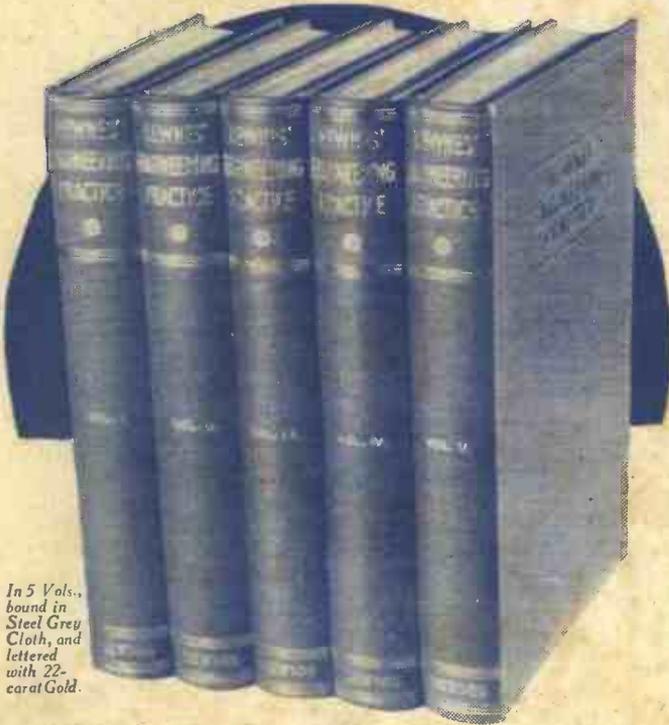
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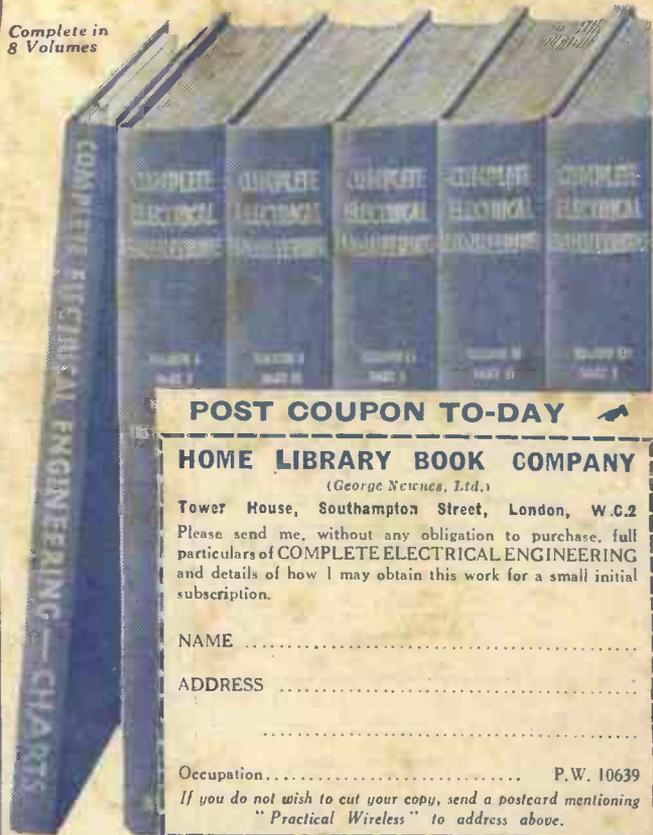
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Edited by F.J. CAMM

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June 17th, 1939.

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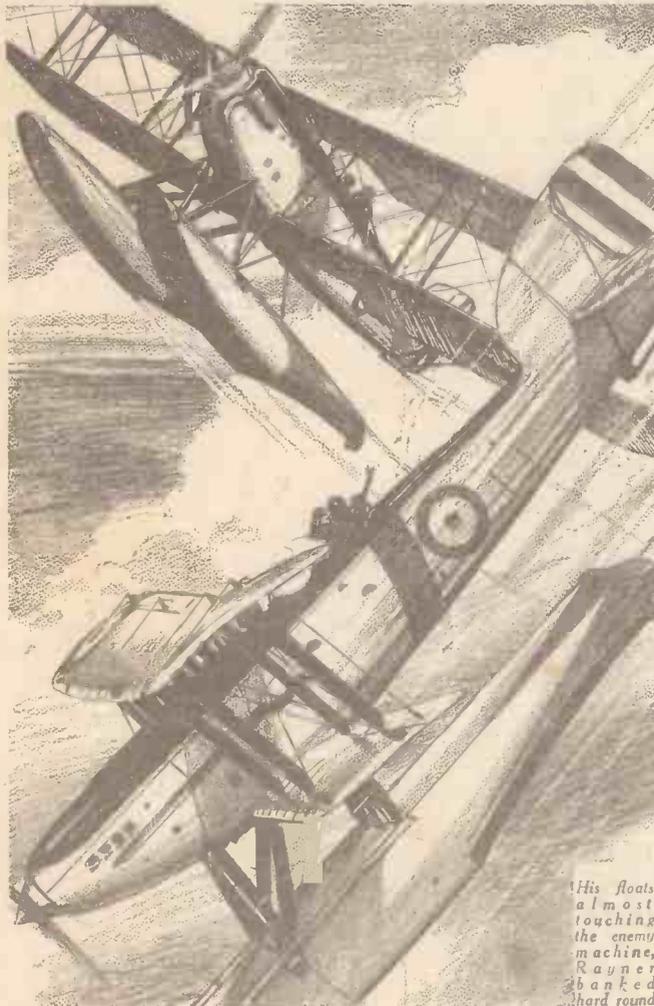
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# SHORT-WAVE FAILURES See Page 321



## Practical

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Edited by F. J. C. CAMM

Technical Staff:  
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B.Sc., A.M.I.E.E., Frank Preston.



Vol. XIV. No. 352. June 17th, 1939.

# ROUND *the* WORLD of WIRELESS

### Remote Control

ONE of the most fascinating side-lines of the home installation is control of the various sections from a distance. In most homes the broadcast receiver forms part of the furniture and although extension speakers are used, the operation of the receiver has to be carried out in one room. We have before mentioned that the radio apparatus should be conspicuous by its absence. We would not tolerate the gas or electric supply meters in the living-room, and the custom is now to place these in a cupboard out of sight, carrying out the switching in the room where the supply is needed. The same thing should take place with radio, and the ideal arrangement would be to install a really powerful set in a cellar, and by means of neat remote-control switches in each room the selection of stations, control of volume or tone and any other desired operation should be effected with ease. There are dozens of different schemes available, and in this issue we give a novel system which has been evolved by one of our readers which will no doubt present points of interest to others who are keen on removing the receiver to a spare room. Improved reproduction may be obtained by such a scheme, as a really good baffle may be used in each room, without the need for including a receiver in the cabinet, and if desired a flat baffle may be built to harmonise with the normal room furnishings.

### French Television O.B. Unit

IT is understood that the French authorities have placed in hand constructional work on a mobile unit based on that now employed by the B.B.C. for outside-television broadcasts. It is anticipated that the unit will come into operation during the autumn.

### Start Point Programmes

AS from June 14th the new transmitters at Start Point and Clevedon will broadcast the Western programme, at present provided by transmitters at Washford, Bournemouth and Plymouth. The Duke of Somerset is to perform the opening ceremony.

### Camp Fire Sing Song

THIS summer the North-East is again to provide broadcasts from camp-fire

sing-songs, and the first programme of this kind in the new season will be on Friday night, June 23rd, when listeners will be taken over to Howick Camp, near Alnwick, Northumberland. This camp is organised by the Northumberland Association of Boys' Clubs, and at the time of the broadcast, in Newcastle Race Week, there will be well over 200 boys from clubs in many parts of Northumberland and Durham at the camp. This will be the first broadcast from the camp, which is situated on the estate of Lord Grey.

### "Listeners Answer Back"

IN the third of the "Listeners Answer Back" programmes, critics of broad-

### Big Variety Bill from the North East

FOR months past Cecil McGivern, B.B.C. programme producer stationed at Newcastle-on-Tyne, has been holding auditions for amateur variety talent and putting on broadcast programmes under the title of "Town and District Variety," the artists in each show being drawn from some particular town or district in the North-East. To end the series, McGivern will on June 20th, present a variety bill called "All the Best!" and its twelve or more turns will be some of the most outstandingly popular acts of the whole series. Singers, mimics, instrumentalists, a yodelling guitarist, and a dance band are on the bill, which also includes a strong comedy element.

### Blackpool Dog Show

BLACKPOOL Dog Show, an important two-day championship event drawing impressive entries from all parts of the country and offering big awards, is to have a place in the broadcasting programmes this year, for on June 21st, on the Northern wavelength, a fifteen-minute description of the show, straight from the ring, will be on the air. The talker will be Dr. L. C. Floyd-McKeon, of Blackpool, who is a judge, a breeder and an exhibitor—and a vice-president of this particular show. His account of the show, from the Corporation Tramsheds at Blackpool, will be recorded as it is given during the afternoon of June 21st, and from this recording broadcast again during the early evening. Both broadcasts will be on the Northern wavelength.

### Broadcasting the Bible

WITH the general title of "The Finest Stories in the World," Val Gielgud will produce dramatic readings of Old Testament stories.

It is not his intention to tamper with the text, but, by means of contrasted voices and the use of actors to speak lines that individual Biblical characters are quoted as saying, to bring out all the beauties of language and of incident.

The first broadcast, which will take place early in July, will be concerned with the story of Ruth.

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casting in the borough of Mansfield will have their chance on June 16th. After a meeting addressed by Stephen Fry, B.B.C. Assistant Programme Director, Midland Region, portable microphones will be taken round the audience so that they can make their comments and put their questions. These will be replied to serially by the speaker. Previous broadcasts of this kind have come from Kettering and Banbury, and when the B.B.C. Exhibition was at Nottingham listeners had a similar opportunity for questions at the microphone. Most of Mansfield's population is industrial, and there are two collieries in the vicinity.

# ROUND the WORLD of WIRELESS (Continued)

## Radio Pirates in France

AS a consequence of the new law, owners of wireless apparatus who listen to broadcast programmes without taking out a licence are now condemned to pay five times the amount of the annual tax on such receivers. The number of broadcasting licences in France on April 30th last was 5,250,285, as against 4,957,886 at the same period a year ago.

## "Bon Voyage," *Mauretania*

LISTENERS all over Britain have heard about the laying-down, the building and the launching of the great new Cunard White Star liner *Mauretania*. Soon they will hear from her again on the occasion of her maiden voyage across to America. This opportunity will come in a North Regional feature programme, "Bon Voyage," on Sunday night, June 18th. It will be largely a recorded programme recalling the building, launching, trials and the departure (from Birkenhead on the previous evening), but it is to include a contribution, by wireless link, from the ship in mid-Atlantic; Richard North will be the commentator, and the whole feature will be presented by Victor Smythe.

## "Stagshaw Searchlight"

E. S. WILLIAMS will present the twenty-fifth number of "Stagshaw Searchlight," in the Northern programme, on June 17th. Since the Stagshaw transmitter opened in the autumn of 1937, the "Searchlight" has been spotting interesting people and odd happenings in the north-east, and has gained a large following among listeners not only in Northumberland and Durham, but in all parts of the North Region.

## G.E.C. Sound Reproduction Equipment in Singapore

G.E.C. sound reproduction equipment has been supplied by the Singapore branch of The General Electric Co., Ltd., to the local Assistant Controller of Labour (Chinese) to help him to make himself heard in his own Court when a local labour dispute is literally in full cry. The report of the special meeting of the Legislative Council to approve the expenditure for this purchase is given in a recent issue of *The Straits Times*.

It appears that during the occurrence of a labour dispute it is by no means uncommon for several hundred employees to crowd into the Court of the Assistant Controller and indeed at times there have been well

## INTERESTING and TOPICAL NEWS and NOTES

over a thousand employees in that Court and its precincts. The ensuing clamour has been so great that even when satisfactory terms have been reached to settle the dispute it has been impossible to convey the fact to the crowds. Now, however, with the help of a G.E.C. microphone, amplifier, and power speaker, it is hoped that law and order will be restored.



Miki Hood, famous British film star, opening Currys' big new store in Bargate, Southampton. Exchanging confidences (?) in background are H. F. Curry, Director (left) and H. L. Shephard, Publicity Manager of Currys Ltd.

## Brass Band Festival

HALF-AN-HOUR'S music from the massed brass bands of a Festival at Skegness, Lincolnshire, will be broadcast on Sunday afternoon, June 18th, in the Northern and Regional programmes. This will be an Outside Broadcast from Butlin's Holiday Camp, and the bands taking part will be those of Luton, Blackhall Colliery, Metropolitan Works, and Coventry Colliery. Denis Wright, military and brass band expert of the B.B.C., is to be the conductor.

## "Between You and Me and the Mike"

BEGUN eighteen months ago by Martyn Webster, the Midland series of intimate revues entitled "Between You and Me and the Mike" have proved popular. Gordon Crier has taken over production for the next in the series to be broadcast on June 16th, during the absence of Martyn Webster in Manchester. The book and music are by two young Midland authors—Edward Mason and Basil Hemp-

seed respectively—and the company consists of eight Midland artists.

## "Quinneys"

HENRY AINLEY, who played the name part in "Quinneys" at the Haymarket Theatre, will play his original part in a radio version which has been prepared by Michael Goodwin to be broadcast in the Regional and West programmes on June 15th; the play will be produced by Michael Goodwin and Felix Felton. The author, Horace Annesley Vachell, lives near Bath.

## Fleetwood on the Air

FLEETWOOD, the Lancashire resort and fishing port, will be on the air for forty minutes on June 23rd, with an excerpt from Ernest Binns' Marine Follies show at the Marine Hall.

## "The West Entertains"

A REGIONAL ROUND-UP is the description of a programme entitled "The West Entertains," to be broadcast in the Regional programme on June 14th. Cabaret will be broadcast from the Grand Hotel, Torquay, including George Gee and Roy Royston, and visits will be paid to the Palace Theatre, Plymouth, and to the Royal Bath Hotel Ballroom, Bournemouth, where the artists will include Claude Dampier, assisted by Billie Carlyle; Murray and Mooney, and Chris Gill.

## Eighth World Education Congress Recognises Esperanto

FOLLOWING the recent recommendation of Esperanto by the Brazilian Ministry of Education, now comes the news that the Organising Committee of the Eighth World Education Congress, to be held in Rio de Janeiro during the coming August, has admitted Esperanto as one of the official languages of the Congress.

## SOLVE THIS!

### PROBLEM No. 352

Boswell had a three-valve A.C. receiver in which the reaction was controlled by a variable resistance joined between H.T. positive and H.T. negative—the arm being taken to the screening grid of an H.F. pentode. This worked very well for a long time and then became noisy. He decided that the control was worn out, and accordingly purchased a new one. When he fitted this he could obtain no control over reaction, although the control was tested and found to be in order and of the same value as the original component. What was wrong? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 352 in the top left-hand corner, and must be posted to reach this office not later than the first post on Monday, June 10th, 1939.

### Solution to Problem No. 351.

Burton overlooked the fact that the detector stage coil is in parallel with the condenser, and thus a D.C. test would give a reading and would not necessarily indicate a short-circuited condenser. The H.F. stage would not give this reading as the coil is connected through the volume-control resistance and would not give a "short-circuit" indication.

The following three readers successfully solved Problem No. 350, and books have accordingly been forwarded to them: A. Kerr, 31, Main Street, Beith, Ayrshire; P. R. Northfield, 121, St. James' Avenue, Thorpe Bay, Essex; M. S. Crothall, 4, Chart Road, Folkestone.

# Aerial Equipment and Installation

Results Depend More Upon the Aerial than the Receiver. Some Valuable Hints are Given in this Article by W. J. DELANEY

**N**OW that the summer has arrived, and the gardens are dry, it is a good plan to devote some attention to the aerial system, either cleaning up an existing installation or erecting something new for the coming season. Unfortunately, in all too many cases the listener considers it a waste of money to purchase sundry insulators and spend time on the aerial, imagining that because he has a really good receiver that all defects in the aerial will be overcome. Although on the medium and long waves excellent results can be obtained with an inferior aerial system, the short waves will soon show up the faults and the usual complaints of "dead spots" or erratic reaction may in most cases be attributed to an unsuitable aerial system. Long-distance reception cannot be carried out with a poor aerial. Many listeners have, unfortunately, no good

### Insulation

Although the wire itself forms the aerial, the insulators play just as important a part. The energy is picked up on the aerial, but this is merely a collector and the signal currents then have to be taken to the tuning circuit in the receiver. Obviously, therefore, no alternative paths must be provided, and this means that a long leakage path must be arranged for at each end of the aerial wire, and the lead-in wire, which forms part of the aerial system, must also be completely isolated from any earthed object. Insulators are not dear and there are dozens of alternative types. On the cover this week may be seen popular types, all of which find a definite use in varying conditions. If the wire is to be suspended between poles or masts, then the ordinary egg type, or better still, the



Fig. 5.—A useful short-wave aerial may be erected as shown here. Ideal where there is limited garden space.

themselves touching, or by such things as spiders' webs being built across them. Such a web has, before now, caused a breakdown in a high-powered broadcast station, simply due to its accumulating moisture and thereby providing a leakage path.

### Wall Fittings

Where a mast cannot be erected at the house end, various types of wall fittings,

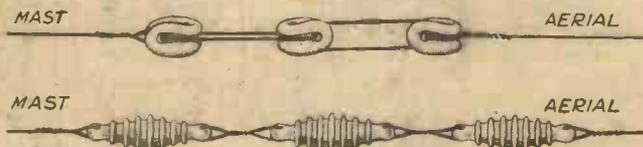
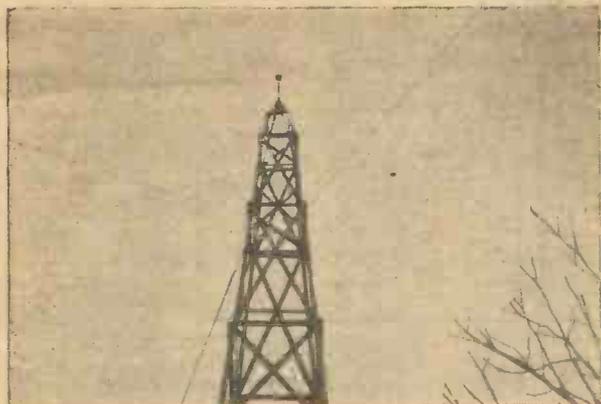


Fig. 1 (left)—A good example of a home-built lattice mast. Ideal for supporting a transmitting or receiving aerial. Fig. 2 (above)—How to link up insulators for aerial support.

garden facilities and have to make shift with short aeriels or alternative schemes, but the following notes will, it is hoped, give some idea of the lines which may be followed with a view to improving your existing installation and thereby obtaining improved results.

ridged cylindrical pattern, should be used—not singly, but in a chain of at least three. Wire may be used to link these together, but turn in the ends of the wires so that there is no risk of short-circuits between them, either from the wires

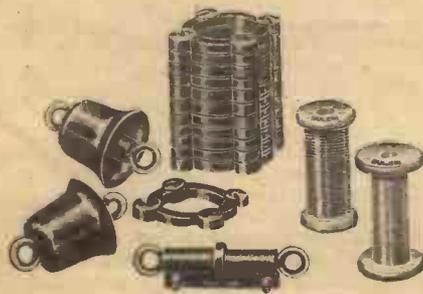


Fig. 3.—A kit of parts for a doublet aerial. This costs 12/-, from Messrs. Bulgin.



Fig. 4.—Another Bulgin aerial kit. This is for a television reception and costs 30/-.

may be called into use. These should, of course, be so arranged that they are well clear of the walls, and the long-screwed spike type seen on the cover will serve in most cases, although greater spacing from the walls can be obtained by attaching a length of board or quartering to a wall, gutter support, or chimney stack, and attaching one of the insulators, such as the Bulgin shrouded type, at the end. Anchor the aerial wire so that it does not sway in the wind. If the aerial is very long it is bound to swing a little, but if possible, arrange things so that in its swing it does not approach any earthed object, and in this latter connection, remember that a tree, although of wood, is earthed. In rainy weather it forms a very good conductor and will certainly cause signal leakage as well as offering a risk of short-circuit at a later date when branches have lengthened. If necessary, the centre of the aerial may be anchored to some fixed object by attaching a guy, via a chain of insulators.

### The Lead-in

Although the lead-in is, as its name implies, intended merely to lead the currents down from the aerial to the receiver, it also picks up energy. Interference is similarly picked up, and this may be balanced out, as has been explained before in these pages, by using a screened lead-in or by using a twin feeder wire, transposed or twisted throughout its

(Continued on page 331)

# Station Indicating Arrangement for Motor-driven Press-button Tuning Systems

A TYPE of motor-driven press-button tuning system for a radio receiver commonly employed to-day, consists of a commutator-type station selecting switch which is coupled to the tuning member of the receiver, and to a reversible electric motor. The station selecting switch consists of a rotor and a stator. The rotor comprises a drum provided with two commutator segments which are connected respectively to the windings of the motor which produce clockwise and anti-clockwise rotation thereof. The stator comprises a supporting member which is arranged to support a number of contacts radially round a commutator; each of the contacts is connected to one of a bank of press-button switches. The arrangement is such that when a press-button is operated, a circuit is closed which includes a source of electric supply, one or other winding of the motor, the rotor of the station selecting switch, the chosen station contact, and the operated press-button; the motor is thus energised, and rotates the rotor of the station-selecting switch, and the tuning element until a zone of insulation between the commutator segments makes contact with the selected station contact, and the motor circuit is broken. Each stator contact is, of course, positioned so that the motor circuit is interrupted when the receiver is tuned to receive a desired transmitting station.

## Interlocking Latch

To avoid the necessity for the operator to hold the selected button during the tuning operation, it is usual to provide the bank of press buttons with a mechanical latch which holds a selected press button in its switch closing position until another press button is operated; that is to say, the press buttons are interlocked by means of a latch so that only one press button may be latched at a time, and the station being received is indicated to the operator by the fact that the press button which selects that station is in its switch closing position. This arrangement is perfectly satisfactory when only one bank of press buttons is provided for controlling the receiver, but the mechanically released form of latch has certain disadvantages when means are provided for controlling the receiver from two or more positions. For this purpose it is preferable to hold a selected press-button in its switch closing position, by means of a holding relay in series with the contacts of the switch, which will maintain the switch closed only until the motor circuit is interrupted by the station selecting switch; that is to say, only until the required tuning position has been reached. As soon as the motor circuit is opened the holding relay is de-energised and the press-button returns to its normal "off" position, and there is then no indication as to which station is being received.

## Station Selecting Switch

An arrangement which overcomes this difficulty is illustrated in the accompanying illustration. The station selecting switch is represented by the reference 1, 2 indicates the rotor of the station selecting switch, and 3, 4, the commutator segments which are connected respectively by leads to the windings 5, 6, of the electric motor.

The rotor of the station selecting switch is mounted on the shaft, indicated by the dotted line XY, of the tuning condenser 7, and the motor is coupled to this shaft in any suitable manner. The rotor 2 of the station selecting switch is provided with a contact 8 which lies adjacent to a zone of insulation between the commutator segments 3, 4. The contact 8 is connected to a secondary winding 9a of the transformer 9.

Two stator contacts 10 and 11 are connected by conductors to one bank of press buttons A which may be located on the receiver, and to another bank of press buttons B which may be located at a point remote from the receiver.

The press buttons at A are numbered 12 and 13, and each one is provided with a holding coil 14 and with a small electric lamp 15, which may be supported behind a panel in the container for the press buttons, and is preferably located behind a window bearing on it the name of the station which will be selected by the

## Operating Details

In operation, if, for example, press button 12 is operated a circuit is completed from the secondary winding 9b of the mains transformer through winding 5 of the motor, commutator segment 3, stator contact 10, press button switch 12 and its holding relay 14, and back to the transformer secondary 9b. The motor is thus energised and the rotor 2 of the tuning condenser 7 rotated until the position of the rotor 2 is such that the zone of insulation is in contact with the stator contact 10; the circuit of the motor is then broken, the holding relay 14 of press button 12 is de-energised, and the press button will be returned to its "off" position by a spring which has not been shown. When, however, the zone of insulation on the rotor engages the stator contact 10, the contact 8 on the rotor also engages this stator contact with the result that a circuit is now completed which includes the secondary winding 9a of the transformer, rotor contact 8, stator contact 10, lamp 15 and the secondary winding 9a. The lamp 15 thus lights up and serves to indicate the station from which the transmission is being received; current from the secondary winding 9a of the transformer also passes through the lamp 19 of the press-button switch 16

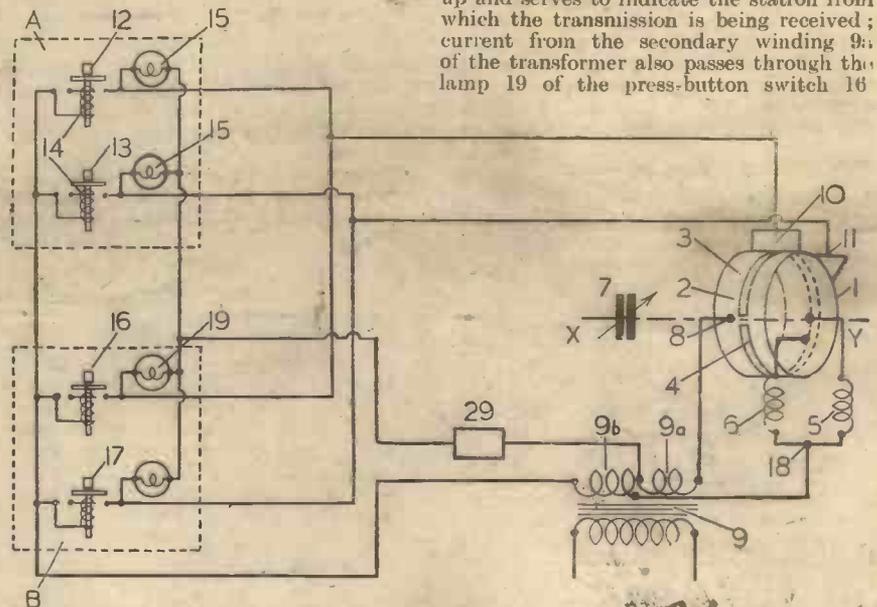


Diagram of connections for the station indicating device described in the text.

particular press button. One pole of each lamp is connected to the conductor between a press button and the station-selecting switch and the other poles of the lamps are connected to the secondary winding 9a of the mains transformer 9 as shown. The bank of press buttons provided at the point B is identical with the arrangement shown at A and press buttons 12 (at A) and 16 (at B) are arranged in parallel, and in series with the stator contact 10, so that the station represented by this contact may be selected from either position. Similarly, press buttons 13 and 17 are arranged to control the circuit of stator contact 11. One pole of each press-button switch is connected to a pole of the secondary winding 9b of the mains transformer 9, and the other pole of this secondary winding is connected to the common terminal 18 of the driving motor.

located at the remote point B so that an indication of the station whose transmission is being received is indicated at both the control positions. The lamps remain illuminated all the time the set is in operation, but the lamp circuit may be linked up with the controls of the receiver in any suitable manner (not shown) so that the circuit will be opened when the receiver is de-energised. A manually-operated switch, indicated at 29, may also be provided to open the lamp circuit if the indicating system is not required.

The arrangement illustrated may be modified in various ways; for example, instead of providing each press button with a holding relay, each bank of press buttons may be provided with a common latching member, actuated by a holding relay which moves into the latching position against the action of a spring.

# CORRECTING L.F.-STAGE FAULTS

Intended for the Less Experienced Constructor, This Article by Frank Preston Deals with a Number of the Simpler Kinds of Fault which Cause Unsatisfactory Reproduction and Indicates How Remedies can Easily be Applied

If the quality of reproduction from a new set is not up to expectations, if there is a lack of volume or if distortion is obviously taking place, the average constructor is inclined to turn to the L.F. portion of the set. Sometimes the fault lies in that section, but this is by no means an invariable rule. Before going to a good deal of trouble to check the transformer, grid and anode voltage and blaming the lack of decoupling, it is wise to eliminate the H.F. or I.F. and frequency-changer sections of the set by connecting a microphone or pick-up (preferably a good pick-up) to the appropriate terminals.

Should the trouble still be in evidence, there is a strong possibility that the low-frequency amplifier is the cause of it. But if the pick-up terminals are joined to the grid circuit of the detector, do not overlook the possibility of a fault in the detector circuit. Also bear in mind that the detector valve—acting as a first L.F. amplifier—will probably overload when the volume-control is advanced; this might result in distortion when using the pick-up, although distortion on radio is due to a fault in the earlier stages.

## “Thin” Reproduction

It is not an easy matter to describe sounds, and it is therefore rather difficult to explain

to be expected only when a valve has been in use for a long time, or when it has been inadvertently over-run. The only satisfactory course is to replace the valve by a new one. The first two points can be checked with sufficient accuracy by means

current, which should be roughly similar to that shown on the makers' literature.

## Defective Components

It should not be overlooked that low filament or cathode emission might well be due to a fault in the anode coupling or decoupling resistor, or to too high a resistance in the cathode circuit of an indirectly-heated valve. The simplest test for the resistors is by replacement, but do not forget that a source of high resistance might be outside the actual resistor—in the mounting clips or soldered (alleged) joints, for example. Even when a resistor is in perfect condition there is a possibility of its value being different from that marked on it or indicated by the colour-coding. This is, of course, extremely unlikely when the component is of good make, but there is a faint possibility; there is also the possibility that the dealer who supplied the component “mis-read” the colour coding.

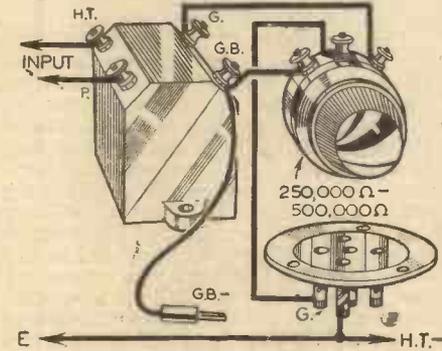


Fig. 2.—When overloading occurs input can be reduced and regulated by means of a potentiometer. In some cases this also improves reproduction quality.

of a voltmeter. It should be remembered, however, that the grid-bias voltage should always be reduced as the H.T. battery runs down, since the bias should be in proportion

## Overloading

Distortion which is noticed only when the volume-control is turned up, or when the set is tuned to the local station, might be due to one of the faults dealt with above or to the application of insufficient grid-bias. With a battery set this might mean that the bias battery is exhausted or that there is a broken or dirty connection to one of the wander plugs. In a mains receiver it might indicate that the bias resistor is of too low a value or that it is short-circuited by a wrongly-made connection, by the resistor holder or by a faulty by-pass condenser connected across it. Again, the easiest method of testing when meters are not available is by replacement. Sometimes a condenser short-circuit can be checked simply by disconnecting the component, but in many instances the resulting hum will be so loud that the test will not be sufficiently conclusive. There is also the likelihood that disconnection of the condenser will cause a certain amount of instability, which would itself produce distortion.

## Unstable Operation

Poor reproduction due to instability in the L.F. circuits is generally evidenced by a light ringing sound which is heard as a background, but there might sometimes be a peculiar muffling or even a groan which is heard at certain volume levels or on

(Continued overleaf)

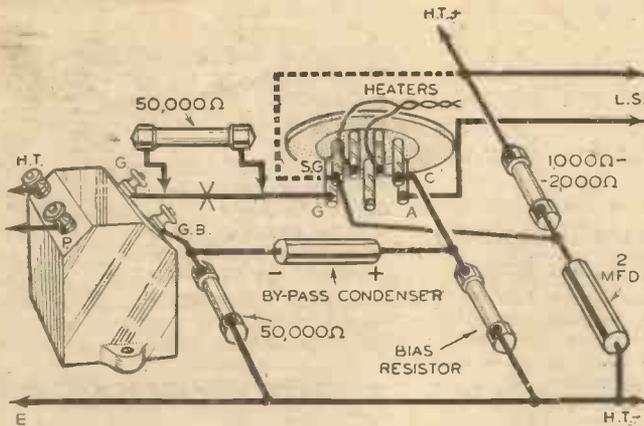


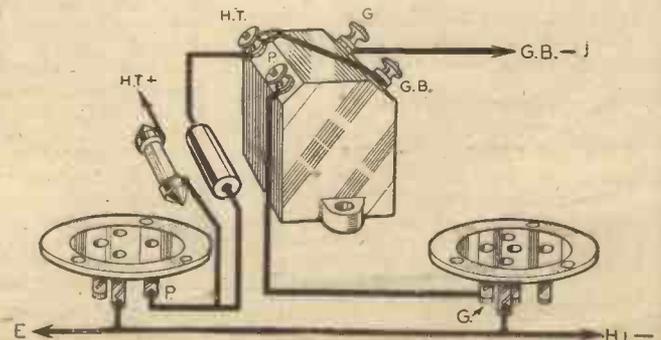
Fig. 1.—Methods of decoupling the grid, cathode and screening or auxiliary grid circuit of pentode output valve. In a battery set the same points apply except that there is no cathode to consider.

the consequences upon reproduction of different low-frequency-circuit faults. Probably the most usual with simple battery sets is that which results in “thin” reproduction. That is, music lacks *timbre* and fullness, whilst there is a “tizzy” sound as a background to speech. Of course, it can be due to the speaker, so if any doubt exists about this the best course is to have it tested on another set or to try a different speaker on your set. But bear in mind that the speaker must be correctly matched to the output valve; this can generally be ensured by connecting to the proper (small-power, super-power or pentode) terminals on the speaker transformer.

Continuance of the poor reproduction when the speaker is exonerated probably points to too low an H.T. voltage, too much G.B. in relation to the applied anode voltage or poor emission from the valve filament. The last-mentioned is normally

to the anode voltage. As most readers are aware, excessive G.B. or insufficient H.T. prevent the valve from giving its proper emission. A useful test for all three of the items just mentioned is to measure the anode

Fig. 3.—Modified connections to a parallel-fed L.F. transformer to reduce its effective step-up ratio. The method of connection tends to give better quality in many simple receivers.



## CORRECTING L.F. STAGE FAULTS

(Continued from previous page)

different kinds of reproduction. This trouble is often due to insufficient decoupling or to the use of an intervalve transformer of too high a ratio for the valve into which it feeds. Decoupling of the anode circuit is in most cases sufficient to prevent any trouble in this direction, but there are times when grid-circuit decoupling should also be employed. With a battery set all that is necessary is to insert a fixed resistor of about 50,000 ohms between the grid terminal of the valveholder and the lead which was previously connected to that terminal. In a mains set it is sometimes helpful to follow the same course, although an alternative or additional decoupling resistor should be included in the lead between the earth line and the grid-circuit component (leak, or lead from the secondary of the transformer) as indicated in Fig. 1.

## New Valves

These modifications are especially helpful if an old valve has been replaced by a new one which has a higher amplification factor or higher mutual conductance; in other words, one which is more efficient. With a pentode it might also be helpful to decouple the screening grid, as also shown in Fig. 1. The decoupling resistor in this case should be kept as low as possible—seldom more than 2,000 ohms, because if it is so high that the H.T. voltage is appreciably reduced, the amplification provided by the valve will be affected adversely.

## Lower Step-up Ratio

When L.F. transformer coupling is used between the valves it is often wise to reduce the step-up ratio provided—or at least to reduce the input to the valve following it—when new valves are installed. One method is by adding a 250,000 or 500,000-ohm potentiometer as shown in Fig. 2, and another is by modifying the connections to a parallel-fed transformer, as shown in Fig. 3. This method of reducing the step-up ratio brings down the actual ratio to a little more than unity if the component has a nominal ratio of between one to three and one to five, but has a smaller effect when the nominal ratio is lower. In some cases the alteration to the connections also improves the quality of reproduction, making the tone rather more "full"; this does not always apply, however.

The positioning of the L.F. transformer has been mentioned in these pages on many previous occasions, but there are some constructors who still do not appreciate that a slight alteration to its position or the angle at which it is placed can sometimes (not very often with modern small components) have a marked effect. When the set has not been built to a published design and there is a form of distortion or instability which cannot be traced to any other cause, it is a good plan to make a few tests in this direction. The same point applies when there is a constant mains hum which is apparently not the result of inadequate decoupling or the use of smoothing and bias by-pass condensers of too low a value.

## Lowering the Pitch

It should not be necessary to lay stress on the fact that "reedy" or high-pitched reproduction when using a pentode output valve might point to nothing more serious than the omission of a tone-compensating filter between the anode of the valve and earth. A variable tone-control can be bought cheaply, or one can be made by wiring a .01-mfd. fixed condenser in series with a 25,000-ohm variable resistor; connect one side of the condenser to the anode and one side of the resistor to earth.

Another simple tone compensator, which also reduces a tendency toward L.F. oscillation, consists of a resistor of between 100,000 and 250,000 ohms joined between the ends of the secondary winding of the L.F. transformer. If this simple arrangement gives the desired effect it is probable that attention to the decoupling or the grid-input circuit would prevent, instead of cure, the prime cause of the trouble. The method mentioned should be looked upon simply as a makeshift or as a means of testing for unsatisfactory design, not as a correct means of obtaining better reproduction.

When using a large mains super-power valve in the output stage, additional decoupling is often desirable, in the form of a power-type resistor of between 100 and 200 ohms. This should be fitted between the anode terminal of the output valve and the primary winding of the speaker transformer; the speaker terminal when the transformer is built into it, as is usual.

## IMPORTANT BROADCASTS OF THE WEEK

## NATIONAL (261.1 m. and 1,500 m.)

Wednesday, June 14th.—Roundabout, all-Regional variety programme.

Thursday, June 15th.—Dance Band programme.

Friday, June 16th.—Recital of French Piano Music.

Saturday, June 17th.—Music Hall programme.

## REGIONAL (342.1 m.)

Wednesday, June 14th.—The Lightweight T.T. Race: Commentaries from the Isle of Man.

Thursday, June 15th.—Quinneys, by Horace Annesley Vachell, from West.

Friday, June 16th.—Between You and Me and the Mike, an intimate revue.

Saturday, June 17th.—Joyce Jamboree: dance band programme.

## MIDLAND (296.2 m.)

Wednesday, June 14th.—Eye-witness account of National Trust Exhibition in Birmingham by Francis Brett Young.

Thursday, June 15th.—Works by William H. Harris: Orchestral and choral programme.

Friday, June 16th.—Listeners Answer Back at Mansfield.

Saturday, June 17th.—Boyd's Shop, by St. John Ervine, presented by the Leicester Little Theatre Company.

## WEST OF ENGLAND (285.7 m.)

Wednesday, June 14th.—The West Entertains: A Regional Round-up visiting the Grand Hotel, Torquay, The Palace Theatre, Plymouth, and the Royal Bath Hotel Ballroom, Bournemouth.

Thursday, June 15th.—Quinneys, by Horace Annesley Vachell.

Friday, June 16th.—Organ and Choral Concert, from the Colston Hall, Bristol.

Saturday, June 17th.—Ghost Darts: Ben Travers' team of Burnham-on-Sea, Somerset, versus A. G. Street's team of T'cfont Magna, Wiltshire.

## WELSH (373.1 m.)

Wednesday, June 14th.—Sunday School Trip, part 1: The Committee.

## First Concert from Liverpool's New Philharmonic Hall

LIVERPOOL'S magnificent new Philharmonic Hall, completed at last on the site of the famous old "Phil Hall," which ended its days in a disastrous fire a few years ago, is to be opened on June 19th; and on the following evening Regional listeners will be able to hear a broadcast of the first part of its opening concert—a notable musical occasion at a hall which has been specially equipped for broadcasting. Sir Thomas Beecham will be the conductor, and Florence Austral (soprano) the soloist with the Liverpool Philharmonic Orchestra and the Liverpool Philharmonic Society's Chorus. Elgar's "Cockaigne" overture opens a programme which includes four choruses from Handel's "Solomon"; Elizabeth's Greeting, from "Tannhauser"; and "Leise, Leise," from "Der Freischütz," and Weber's "Oberon" overture. For a quarter of an hour before the concert starts, Northern listeners will hear a description of the new hall by W. G. Holford, the distinguished young Liverpool architect, who is Lever Professor in Civic Design at the University of Liverpool.

Thursday, June 15th.—Music by Grieg and Sibelius: orchestral and instrumental programme.

Friday, June 16th.—Choral and instrumental programme.

Saturday, June 17th.—Noson Lawen: Night of Entertainment.

## NORTHERN (449.1 m.)

Wednesday, June 14th.—Public Enquiry: Should the Rates be Stabilised? First of new series of broadcasts of public meetings.

Thursday, June 15th.—Orchestral concert.

Friday, June 16th.—Exchange Programme between students of Royal Manchester College of Music and students of the Leipzig Konservatorium.

Saturday, June 17th.—Saturday Concert Hall.

## SCOTTISH (391.1 m.)

Wednesday, June 14th.—Toom Byres, a comedy of the Scottish Border by Robert McLellan.

Thursday, June 15th.—Scots Songs.

Friday, June 16th.—Band programme.

Saturday, June 17th.—Scottish Dance music.

## NORTHERN IRELAND (301.1 m.)

Wednesday, June 14th.—Accent on Rhythm: a programme of dance tunes, old and new.

Thursday, June 15th.—Organ music from the Ritz Cinema, Belfast.

Friday, June 16th.—Piping, Fiddling and Singing programme.

Saturday, June 17th.—Flute Band and Silver Band programme.

# ON YOUR WAVELENGTH



## A Midget American Portable

I HAVE been testing out for the Editor of *Practical Motorist*, one of our sister weeklies, a midget American portable and I am amazed at its performance. It is a 4-valve superhet and measures only 9in. by 7½in. by 5in., which makes it suitable for use in car, boat, or for picnic purposes. It does not use a low-tension accumulator, but is operated from dry batteries which give a life of 300 hours, continuous use, or 500 hours intermittent, before the low-tension side requires renewing. It weighs only 9lbs. complete with batteries, and the specification includes a built-in directional aerial, airplane style of dial, signal to indicate when the switch is turned off, and a modern fabric-covered cabinet. It costs £5 15s. od., and is quite the most efficient small portable of the commercial type which I have yet tried.

English manufacturers are, I know, producing some portables using the new low-tension dry cells, but I have not yet been permitted an opportunity of testing them.

This journal, of course, pioneered the three and four-valve superhet circuits, and also the design of midget portables. It was due to this journal that midget batteries and speakers, tuning coils and condensers were first manufactured.

## The Wireless Den

I HAVE not received a large response to my request for photographs of readers' dens, but Mr. R. Guillaume, Jr., of Weybridge, has sent me the photograph (reproduced) of his. He tells me that his den is roughly square—the smallest in the house, and is next to the kitchen. He has laid this out to include a table, a carpenter's bench, cupboards and chairs, whilst the walls are covered with valve comparison tables, and a map. The cupboards contain spare parts, and everything is in orderly array. This reader combines photography with wireless, and the room also contains a certain amount of photographic apparatus. The den is more or less self contained. He uses an outside aerial. His window looks out over the tennis lawn, and

By *Thermion*

he tells me that he has enjoyed very many pleasant hours in this room.

I wonder how many of my readers have realised that lofts make particularly good wireless rooms; being at the highest part of the house a very short lead-in can be used, and if the loft has a boarded floor there is adequate floor space to accommodate all of the impedimenta. Most lofts are entered through a cavity covered by a board, and access to the loft is by means of a pair of steps. There are



A corner of Mr. R. Guillaume's wireless den.

now, however, many loft ladders of the collapsible type which replace the board covering the loft hole, and these ladders disappear into the loft and close the cavity when the loft is not in use, or if you desire to work and make the usual wireless noises without disturbing the rest of the house. One or two readers have adopted this plan.

I shall still welcome photographs and details of wireless dens, for it is in these dens that many thousands of interesting experiments are being conducted. Wireless science owes as much to the wireless amateur and his den as it does to the scientist and the laboratory.

## A Seasonal Hobby?

ACCORDING to the B.B.C. survey, A listeners forsake their wireless sets in considerable numbers during the summer. The peak listening period, of course, is the winter. I suppose nothing can be done, or ought to be done, to change this state of affairs, for the appeal of the wireless programme can never supersede the attractions of outdoor pursuits in summer. I am not certain that television when it is a national as distinct from a local service will not change this order of things. It is certain to do so for a few years at least, until television becomes the accepted form of radio entertainment. Considerable moves are being made to establish television all over the country, and the Postmaster-General, the B.B.C. and the Trade are all co-operating to that end. It takes time, however, to erect a television transmitter, to arrange for television artists and announcers, and so on. It will therefore be at least a year before further transmitters are erected.

The efforts need to be implemented by a considerable public demand for television in the provinces, and I express the view that when the public samples television at Radiolympia this year, that demand will be forthcoming. To see is to believe, to marvel and to want, and those are the ingredients of the insatiable desire which alone can break down resistance and opposition, and encourage manufacturers.

At present manufacturers are working to supply a local demand. That is large, but by no means so large as it will be when television is national.

The new setting at Radiolympia for wireless sets and television will, I hope, exert an enchanting influence on the public and those who hold the purse strings. The Trade is doing its best to persuade responsible people to pay more than lip service to the new science.

That is one reason why provincial people who do not normally visit Radiolympia should this year make a special point of doing so. There must be tens of thousands of provincials who have never seen a

demonstration, or at most have a recollection only of the old 30-line disc machines. Television is now as perfect as sound broadcasting, and it is necessary for the public to change its ideas, which in many cases have been fostered by the cynical writings of newspaper "experts." Many of these have been none too kind to television, and it must be a bitter pill for them now to have to retract much of what they have said. Those responsible for developing television must take fiendish joy in seeing journalists eat their own words.

**Cross Sections and Market Surveys**  
I DO hope the B.B.C. will dismiss from its official vocabulary that horrible yankeeism "cross section of the British public"—a term now being plugged to death by the British Institute of Public Opinion which alternates the use of this expression with "representative sample of the British Public." I hate these terms as much as I do "market survey." The use of these phrases is an effort to make us believe that a process of analysis is an exact science. A cross section is an engineering term, and in mechanical drawing you can take a cross section through plan, or elevation, or at an angle through a particular object. The term is being used by the newspapers extensively. If this sort of thing goes on the English vocabulary via the newspapers, the B.B.C. and the films will become almost entirely American. It is said that the English are a strange race which the Americans try to understand, and that the Americans are a strange race which the English don't try to understand. However, I see no more reason to speak in Americantese than I do to speak in French, German, or any other language which is not true English.

#### Toscanini's Praise of B.B.C. Symphony Orchestra

"IT is one of the best orchestras I have ever conducted. . . . I am very happy, very pleased, very satisfied with everything."

When Toscanini, one of the world's greatest living conductors, chose those words to express, with glowing sincerity, his appreciation of the B.B.C. Symphony Orchestra, he reduced to absurdity the assertion, once fashionable, that the English are unmusical. More than that, his judgment gave proper perspective to the importance, in the history of music in England, of the formation of the orchestra in 1930.

Till then the very existence of orchestras in this country had been somewhat precarious. Lack of funds

## Notes from the Test Bench

### Potential Dividers

**I**N a large number of American circuits it is found that potential dividers are used for obtaining the various H.T. voltages required throughout the receiver. Similar components do not appear to be available in this country and in several cases we have found that constructors have attempted to construct similar devices by using a number of fixed resistors joined in series across the H.T. supply. This idea is quite good, but a point which is overlooked is that the wattage rating of each resistor will vary. It is not sufficient to take the total current across the divider and work out the wattage of the whole component. Instead, the total current should first be ascertained and then each resistor must be calculated separately, unless, of course, you are prepared to obtain all resistances of higher rating than is necessary.

### Fixing Control Knobs

**M**ANY constructors build a good receiver, and when installing it in the cabinet spoil the appearance by scratching the front by allowing the screwdriver to slip whilst locking grub-screws in the control knobs. Unfortunately, these screws are not easily accessible and a small watchmaker's screwdriver is generally needed. If the control knob is held rigidly by the fingers of one hand whilst the screw is tightened, no difficulty should arise, but a dodge worth passing on is to cut a large disc from tin or aluminium and cut a small hole in the centre to clear the majority of standard fixing bushes or spindles. A cut is then made from the edge of the disc to the centre hole. The disc should be pushed over the spindle, the knob then placed on and the screw tightened. Should the driver slip the panel will not be defaced. When the knob is locked up the disc may be removed by opening the slot and lifting it over the knob.

### Radiating Receivers

**W**HERE an oscillating valve is used it should be remembered that the radiations from wiring can extend to a considerable distance. A superhet, for instance, operated in fairly close proximity to an ordinary broadcast receiver, may introduce trouble due to the radiations from the oscillator stage if this is not properly screened. A signal generator, heterodyne meter, or other similar instrument, should, therefore, be enclosed in a metal box, efficiently earthed, and leads from it should be carefully arranged or screened.

made it impossible for them to secure adequate rehearsals—especially in the case of new works. Economic necessity forced the players to eké out a livelihood by teaching and accepting "outside" engagements whenever they could; one result was that deputising, prime bane of orchestral conductors, was common.

Conditions such as these raised almost insuperable difficulties in the way of organising orchestral concerts, and of maintaining an orchestra matching the best on the Continent.

### A National Orchestra

**T**HEN, suddenly the gloomy scene changed. The B.B.C., realising well enough that the time had come for bold action if orchestral music in England was to be rescued from the disintegrating forces which threatened it, decided to create a permanent, salaried, national orchestra.

From that moment England was endowed with a body of carefully selected musicians, drawn from all parts of the country and engaged on a full-time contract under the direction of a permanent conductor—Sir Adrian Boult, the B.B.C.'s Director of Music.

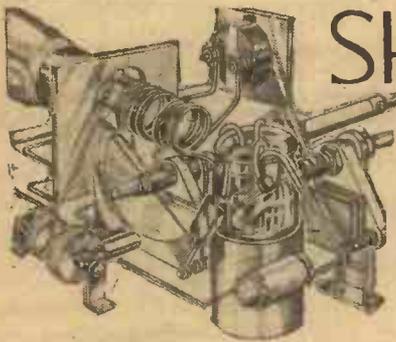
Because the players are all salaried, deputies are not allowed. As a result, the members play continually together, a factor that has welded them into a homogeneous instrument, alive, sensitive, responsive, even to the almost imperceptible flicker of Toscanini's expressive fingers. He, indeed, has been so gratified with their work that, on several occasions he has cancelled rehearsals, satisfied that their playing was as perfect as he would have it.

With such an instrument at its disposal, the B.B.C. has naturally been able to expand and develop its music policy in a way that would otherwise have been impossible. So it is that the orchestra—and the various sections into which it can be divided to meet the requirements of different types of music—is responsible for more than four hundred programmes a year; its public concerts are among the most important musical functions in the country.

In its travels, undertaken in accordance with the B.B.C. policy of making the orchestra a national, rather than a Metropolitan, institution, it has also gone abroad, making appearances in a number of European cities—appearances that have been enormously successful.

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# SHORT-WAVE SECTION

## SHORT-WAVE FAILURES

Many Constructors Fail to Get Satisfactory Results on the Short-wave Bands and are Inclined to Condemn Short-wave Listening Rather than Attempt to Overcome Their Defects. By RADIO ENGINEER.

**L**ISTENING to short-wave transmissions is all bunk. It is one of those things which is greatly over-rated, and although I have fiddled about with a short-wave set for quite a while, I have never yet been able to get a kick out

they attempt to try their hand at S.W. work? Through meeting so many pessimists, I have been able to compile a little list of the things which are mainly directly responsible for their feelings, and the lack of results.

The list is quite small. In fact, the items could be tabulated under four headings, namely, poor or faulty selection of apparatus, lack of operating knowledge and patience, failure to select right times of listening and, lastly, unsatisfactory aerial arrangement or local conditions.

Let us take the first of these and see what are the snags. Now, assuming that the person concerned is a beginner to this section of radio, it will be obvious that the most simple set will be the best to graduate with, and I would suggest an efficient little battery-operated two-valver. The circuit of such a receiver is very simple and quite inexpensive to build, but don't make the first mistake of using any odd inferior parts because you only wish to see what it is like. That is one of the biggest blunders that can be made. It must be remembered that short waves have very high frequencies, and currents of that nature do some very funny things if they are not given a square deal. For example, in a medium- and long-wave set, which is concerned with frequencies of a much lower order, the constructor/operator is allowed far greater latitude in all respects, but with the higher frequencies particular attention must be given to the lay-out of the components, the wiring, the selection of the parts—from the point of view of H.F. losses and self-capacity, the operating conditions, and the actual aerial to be used.

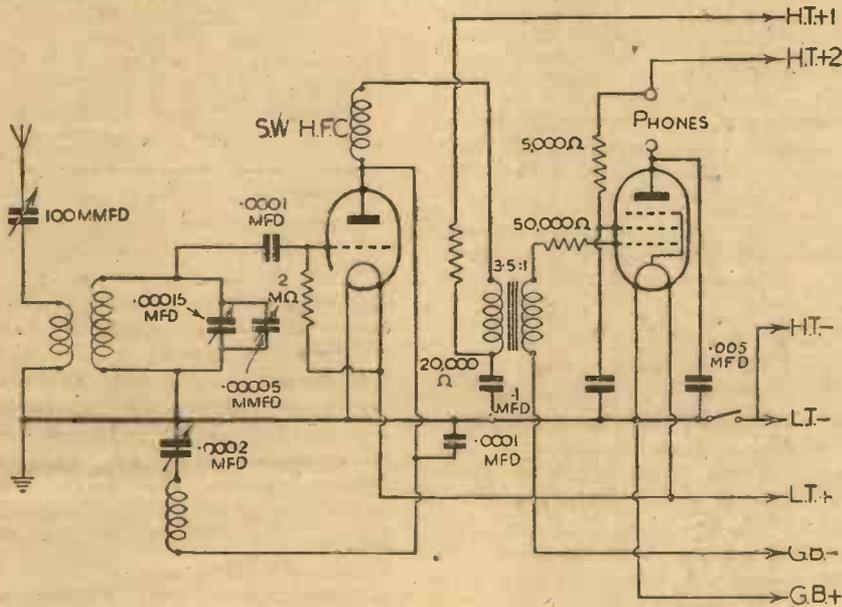


Fig. 1.—A reliable well-tried circuit. It is ideal for the beginner as it is not too difficult to operate.

of it. The results are never the same for two evenings following, in fact, I am beginning to wonder if all the talk about the thrill of listening to America and stations in the remote corners of the world is—well—just blarney!

No. Get back in your chair again and don't worry about penning an indignant letter to the Editor to ask what is wrong with the writer, because the above statement does not come from me; it is a typical example of what many so-called enthusiasts have said to me from time to time.

Of course, it is very difficult to convince such persons that short-wave listening can and does provide endless thrills, plus a generous portion of entertainment, because their own efforts always, apparently, most unsatisfactory, seem to render them insensible to any explanation or argument. Fortunately, however, there is always the trump card to play in the form of a practical demonstration and, unless the rebel is one of those impossible persons, one or two favourable spells on a decent installation usually awakes the keenest interest, and a strong desire to know how it is done.

### Why So Many Failures?

Why is it that so many constructors appear to fail most hopelessly as soon as

The theoretical circuit of a reliable two-valver is given in Fig. 1, and if good parts are used and the lay-out arranged to keep the wiring of the aerial tuning and detector circuits as short as possible (Fig. 2), very satisfactory results can be obtained with the headphones. For doubtful listeners I would mention that with an aerial of average efficiency a set of this type is capable of logging amateur stations on most continents.

### Coils

Many makes of plug-in coils are now available or, if it is desired to make your own, reference should be made to the various articles which have appeared in past issues dealing with coil-construction. The

(Continued on next page.)

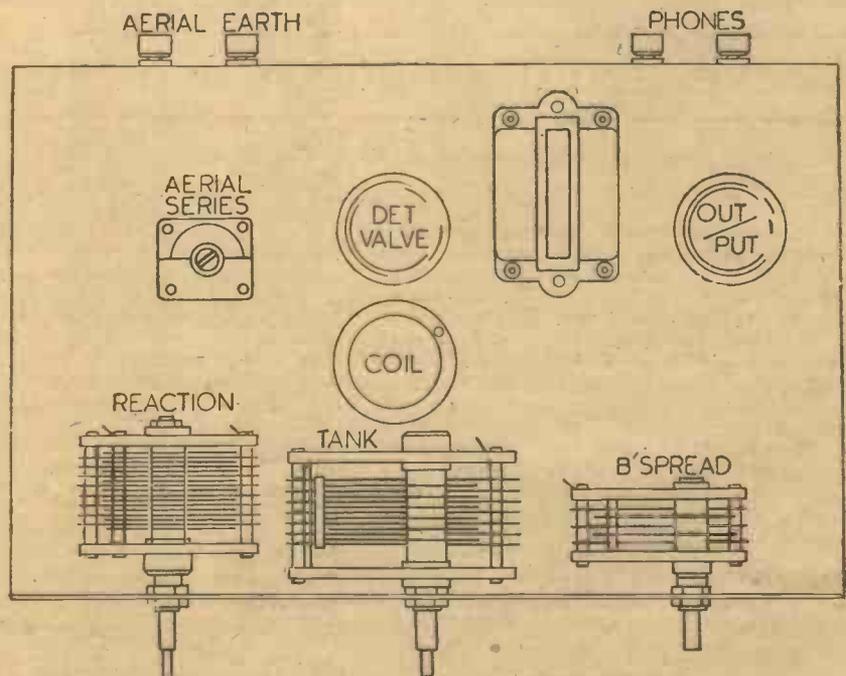


Fig. 2.—A suggested lay-out for the circuit shown in Fig. 1. Baseboard or chassis can be used.

## SHORT-WAVE SECTION

(Continued from previous page)

Ranger S.W. Two, described in the issue of March 11th, 1939, is ideal for those who wish to construct the coil. When selecting commercially-produced plug-in coils it is essential to use the capacities specified by the makers for the tuning and reaction condensers, otherwise the tuning range will be affected. For those who wish to use .0005-mfd. tuning condensers, it should be noted that it is possible to get coils wound for use with that capacity.

## Variable Condensers

Owing to the very high frequencies involved it is possible for a few degrees on

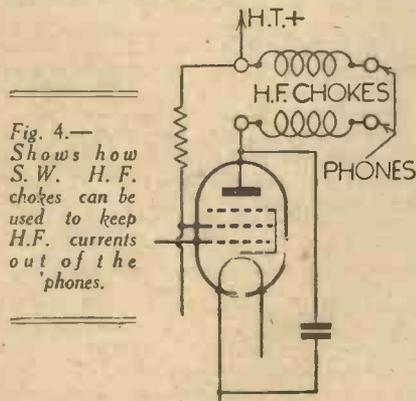


Fig. 4.— Shows how S.W. H.F. chokes can be used to keep H.F. currents out of the phones.

the tuning dial to represent the settings of several stations, therefore it is essential, if wide spacing and easier tuning is required, to use a tuning condenser having a low capacity. An average value is .00015 mfd. when used in conjunction with a good slow-motion dial.

A better adjustment and, likewise, even easier tuning, can be obtained by using what is known as *band-spreading*. This consists of a very small variable condenser connected across the main or tank tuning condenser. For example, with the above value of .00015 mfd. a band-spread con-

denser of .00005 mfd. should be used. The idea is shown in Fig. 1.

## H.F. Stoppers

To keep the high-frequency currents along their correct paths, it is always advisable to make use of H.F. stoppers in various parts of the circuit as these all help to improve the overall efficiency of the set by making it more stable, which, in turn, allows a greater gain or amplification to be obtained, together with easier operation.

Reliable H.F. chokes, especially wound for short-wave work, should be used, although resistances having a value of, say, 10,000 ohms for anode circuits and 50,000 ohms for grid circuits are satisfactory substitutes.

In many instances it will be found that H.F. currents do get through to the headphones, causing a peculiar form of instability and apparent hand-capacity effects. In such instances a good H.F. choke in each phone lead (Fig. 3), will usually eliminate the trouble, but it is far better to try and trap the cause in the stages preceding the output valve.

## Operating a Short-waver

Unlike the average modern medium- and long-wave broadcast receiver, it is not possible to turn the tuning control and just let the stations, so to speak, fall in.

Tuning on the higher frequencies calls for a very much more delicate and accurate touch and, until one has got used to the feel of any particular short-wave set, many transmissions will be passed over; in fact, it is not unknown for a beginner fail to pick up a signal, although many were there when an experienced hand took control.

It is this rather important item which calls for patience on the part of the novice. Each wave-band must be explored a fraction of a degree at a time, keeping the reaction control adjusted so that the circuit is always just at its most sensitive point. This, by the way, does not mean *oscillating*.

Particular attention should be paid to the detector valve, the operating voltages, the value of the anode by-pass condenser, and the source of the H.T. supply.

## The Aerial

It is always a very difficult matter to say that any one type of aerial is the best, as so much depends on local conditions and space available.

With the average "inverted-L" type of aerial, having an overall length of, say, 60ft., quite good reception should be obtained, provided the horizontal portion is at least 20ft. to 30ft. above the ground and well clear of surrounding earthed objects, such as trees, buildings, and overhead wires.

The down-lead must also be kept as clear as possible from walls, and some simple arrangement adopted to prevent it from swaying about, otherwise signal fluctuation will, no doubt, be experienced.

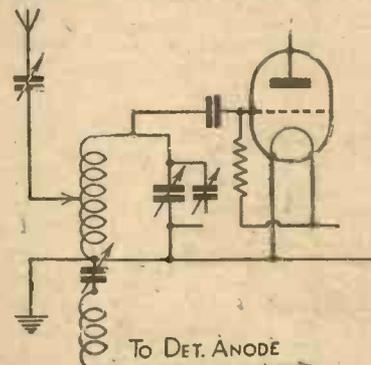


Fig. 3.—To reduce aerial damping a series condenser is usually advisable. The aerial can also be tapped down the coil.

With an aerial of the length mentioned above, a series aerial variable condenser should always be embodied in the installation to allow the aerial damping to be reduced to a degree which allows satisfactory reaction and selectivity on all wavebands. An air-spaced variable condenser, having a value of .00005 mfd. to .0001 mfd. will be suitable (Fig. 4).

Elsewhere in this issue will be found comprehensive details of aerial requirements.

## Leaves from a Short-wave Log

## Oslo Programmes on High Power

OSLO appears to have suspended its broadcasts through LKC (1 kilowatt) on 31.48 m. (9.53 mc/s), and is now working daily from B.S.T. 20.00-07.00 through the new 5-kilowatt station LLG, operating on 31.22 m. (9.61 mc/s). Signals and modulation are excellent at all times.

## The Tokio Transmissions

THE Japan Broadcasting Corporation now radiates the daily short-wave transmissions through the following stations: JZL, 16.87 m. (17.78 mc/s), B.S.T. 22.30-23.30, and 02.00-02.30; JZK, 19.79 m. (15.16 mc/s), 06.30-07.30; 13.00-15.30; JZJ, 25.42 m. (11.8 mc/s) 14.00-15.30, and 22.30-23.30.

## Broadcasts from Newfoundland

LISTENERS report the reception of radio programmes emanating from the medium-wave station VONF, at St. John's (Newfoundland), via VONG, on 50.15 m. (5.98 mc/s). Address for reception reports: Stations VONF and VONG, Box 135, St. John's (Newfoundland).

## A Good Canadian

CHNX, relaying CHNS, Halifax (Nova Scotia), on 48.92 m. (6.13 mc/s), may be logged almost nightly after B.S.T. 22.00. This 500-watt is on the ether daily until B.S.T. 04.15, starting its programmes on weekdays at midday, and on Sundays at B.S.T. 17.00. The studios are located at the Lord Nelson Hotel. Broadcasts close with the playing of the hymn: *O Canada*. Address: The Maritime Broadcasting Co., Ltd., P.O. Box 998, Halifax (Nova Scotia).

## Printed News Bulletins by Radio

THE *St. Louis Dispatch* recently inaugurated its first teletype newspaper. The first issue of this radio-electrical publication was transmitted from 2.0-4.16 p.m. on 9.494 m. (31.6 mc/s), and comprised nine pages of text five inches wide, each of four columns. The broadcast is now regularly received by the owners of the special apparatus which prints the paper in their own homes.

## Another Polish Station?

IT is reported that a 2-kilowatt transmitter installed at Niepokalalnow (Poland) is carrying out experimental broadcasts every Sunday from B.S.T. 19.00-20.00 on 41.2 m. (7.28 mc/s).

## From the Land of Fruit and Flowers

W4XB, relaying WIOD, Miami (Florida), broadcasts the radio programmes of the Isle of Dreams Broadcasting Company on 49.67 m. (6.04 mc/s), with a power of 5 kilowatts. You will hear the announcer give out that you are "listening to International station W4XB, Miami, by the palm-fringed shores of Biscayne Bayne in tropical America." (Transmissions are made on weekdays from B.S.T. 18.00-20.00, and 02.00-05.00, and on Sundays from 21.00-23.00, and 02.00-05.00.)

## Radio Nacional de Peru

WITH this coupled to that of *Emisores y OAX4Z*, the principal radio station at Lima is now clearly received on most nights on 49.33 m. (6.082 mc/s) between B.S.T. 00.30-05.00. The distance from London is roughly 6,400 miles, the standard time in Peru being six hours behind B.S.T. All reception reports for verification should be addressed to these stations at Avenida Petit Thouars, Lima (Peru), South America.

A PAGE OF PRACTICAL HINTS

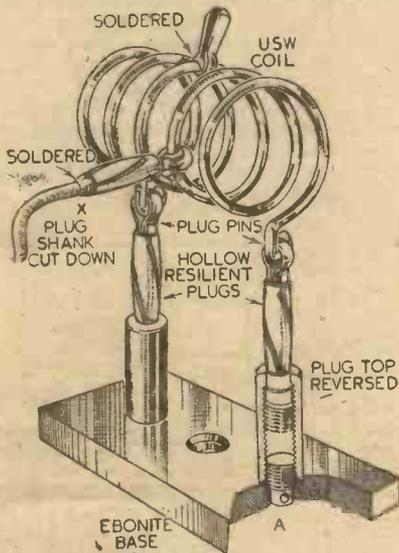
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

Preventing Shorted Turns in Short-wave Coil Tapping

As will be seen in the accompanying sketch, with the aid of a few hollow-type resilient plugs and some split-pin plug shanks I have evolved a simple and efficient method of tapping for short- and ultra-short-wave coils, where the turns



A useful dodge for tapping S.W. coils.

would be liable to short circuit if crocodile clips or any "free" connections were made. Using split plug pins, these could be simply wound on to the desired turns in predetermined positions, finally soldering to the turns if the gauge of wire does not provide a satisfactory grip when the fly lead shank "X" is fitted.

Whilst trying this arrangement out, I decided that it would be a good idea to use the same principle for mounting the coils, and in each instance, therefore, I bent the ends of the coil through two split pins, finally soldering as depicted. Standard hollow resilient plugs of well-known make were then used for securing to a suitable piece of ebonite, which served as a mounting base, but the insulating sleeves had to be reversed, the plugs passing through the original cable entry end, whilst the other end is fitted by screwing on to sawn-down plug ends screwed into the ebonite base "A." The fly lead "socket" was obtained by cutting down one of the hollow plug shanks, as shown.—R. J. LEEFE (Putney).

A Pre-selector tuning or Reaction Device

It occurred to me that if I cut down the vanes of an old condenser and, using the existing rotor with modified vanes

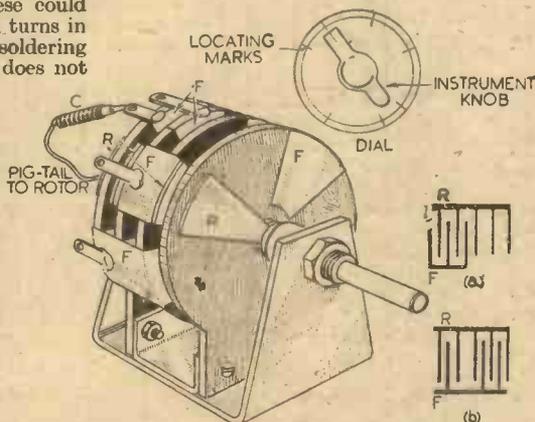
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intermeshing with suitably-adjusted fixed vanes, quite an efficient pre-tuning unit could be made up for use either as a tuning or reaction system. To this end I cut a number of cardboard discs, and two wooden end mounting pieces, assembling these equidistantly spaced on aluminium mounting brackets, as shown. The difficulty at first was to determine the exact sectional capacities for the different settings, but I got over this by using lead foil glued to the discs in the approximate positions required by the reaction scheme in which this unit was to be used as a test. With a fine penknife blade I was able to trim the fixed "vanes," taking notice of the settings,



A novel pre-selector or reaction device.

and marking off with a pencil on each disc. These lead foil plates were then replaced by thin tin plates likewise glued on, the solder tag connections of course being soldered, as illustrated. It was found then that there was some slight inaccuracy in the different set capacities, but this was soon adjusted by the addition externally of small wire-wound (with shorted turns by soldering) home-made condensers, in which

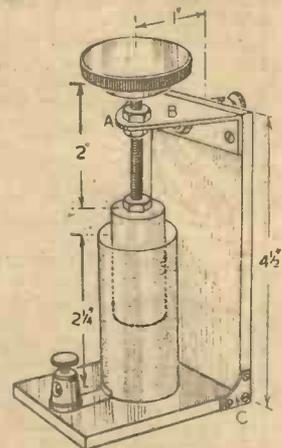
the centre "plate" constituted a thick copper wire which could be slid in or out of the outside "plate" or winding; this condenser is shown at C. Systoflex was used as a dielectric for these condensers.

The inset diagrams (a) and (b) show two of the capacity adjustments arranged, and it will be noticed that although there are only three fixed vanes illustrated in these examples, the relationship or spacing provides quite an appreciable difference in capacities, the reason for which will be quite clear on studying the interleaving. A neat instrument knob and a home-calibrated paper dial complete the hook up.—F. S. WELSH (Chelmsford).

Small Capacity Aerial Condenser

REQUIRING an aerial condenser of maximum capacity, .00015 mfd., I devised one out of flashlamp containers, as shown in the sketch. Two containers are required, the larger one being taken from a two-cell cycle battery, and the smaller one from an old grid bias battery. Both were easily cleaned out, a terminal being soldered to the base of the larger zinc container. A threaded brass rod is soldered to the base of the smaller container, as shown. At A, a nut, which will fit the serewed rod, is soldered over a hole in the bracket B.

The larger container is fastened to the base of the stand by a bolt through the centre, and the threaded rod is screwed through the nut A. A knob is fitted to the end of the threaded rod, and an angle bracket screwed on at C to give stability to the upright. It will be found that this arrangement will allow very fine adjustments to the aerial circuit.—A. MITCHELL (London, S.W.).



A simple small capacity aerial condenser.

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# AN A.C.-D.C. REMOTE CONTROL SYSTEM

## Constructional and Operating Details of a Piece of Apparatus

THE method of remote control to be described makes use of either two or three small control wires. This may seem a disadvantage but the control may easily be varied to suit individual requirements, and may be extended to give any degree of control. Many refinements will be dealt with, which may be omitted as required.

The basic principle will first be described with reference to Fig. 1. T is a small transformer supplying 6-12 volts. A is a relay operating on A.C. only, and B is a polarised relay. On pressing key K, an alternating current will flow from transformer T,

### Construction of Relays

With regard to relay A, it was found impracticable to make a relay which would operate on A.C. and not on unsmoothed D.C. This is overcome by extra contacts on relay B. Relay A is made so that it will operate on either A.C. or D.C., but to have a "time lag" greater than the relay B. When A.C. flows through the circuit, relay

In order to obtain the time lag, either a small vane should be attached to the shaft A, which dips into oil, or shaft A should be made to drive a small air vane through gearing. The time lag necessary will depend on relay B.

### Relay B

This relay may be any polarised relay, (a moving-coil relay being very suitable), and it can be constructed from any moving-coil movement by the addition of contacts. It may be found necessary to "weight" or damp the moving-coil to prevent excessive vibration, due to the unsmoothed D.C. and A.C.

The rectifier R is a small metal rectifier, as it will only be used for a few minutes at a time.

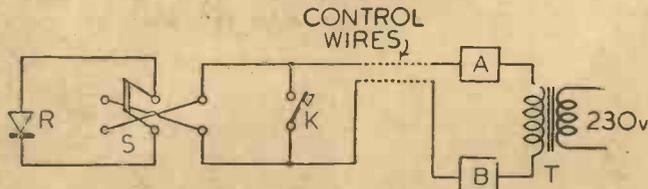


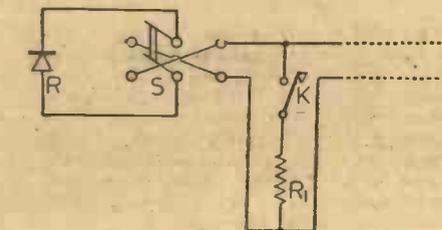
Fig. 1.—Diagram illustrating the basic principle of the mains operated remote control system described in the text.

through A and B. Since B is a polarised relay it will not operate, whereas A will operate. If change-over switch S is placed to one side, a direct current will flow from the transformer T through the small rectifier R, and through relays A and B. Relay A will not operate on D.C., but B will operate in one direction or the other depending on the direction of current flow through it, which is determined by the position of the switch S.

B does not operate but relay A does. When D.C. flows, B will operate before A, and short-circuit A through the extra contacts of B, thus preventing A operating.

### Two-wire Remote Control System

This is practically as described above and gives the following controls:



1. "On-off" control.
2. Tuning control (or push-button control).

The circuit diagram is shown in Fig. 2. Relay A closes its contacts when A.C. flows through it, and completes the circuit from the transformer T to another relay C. This relay works alternatively "on" and "off" (i.e., with one impulse its contacts close, and with the next impulse its contacts open) and control the wireless set, being connected as shown. The construction of this type of relay is described later. A resistance R<sub>1</sub> is placed in series with the key K to limit the current to approximately that through the rectifier R.

Thus, to switch the set "on" or "off" it is only necessary to press key K once.

Relay B is shown connected to a motor M, which is coupled by a slow-motion drive to the tuning condenser. This motor can be made from any small motor by unwinding the field winding and winding on two fields in the opposite directions, so that the motor runs one way with one field, and the reverse way with the other field. Thus, by operating change-over switch S, relay B operates one way or the other, making motor M run in a forward or reverse direction.

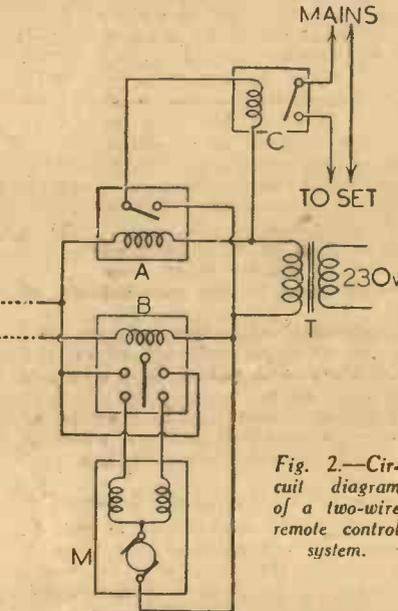


Fig. 2.—Circuit diagram of a two-wire remote control system.

Fig. 3 shows one method of constructing relay A. It consists of laminations I (old transformer stampings are suitable) on which is wound a coil C. A small iron armature A<sub>r</sub> is fixed to the shaft A, which carries the contacts (not shown). The armature is kept against a stop S<sub>2</sub> by a small spring S.

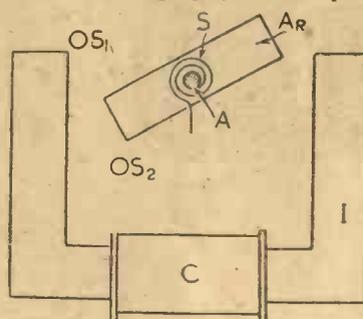


Fig. 3.—Details of a relay to operate on either A.C. or D.C.

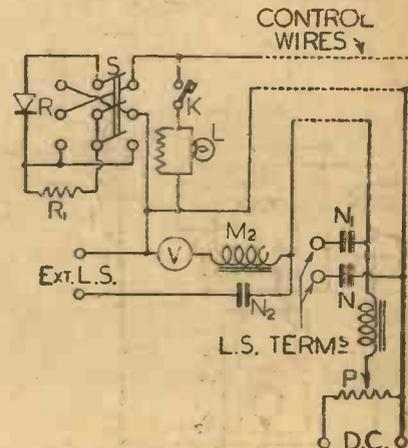


Fig. 4.—Circuit arrangement for tuning with a two-speed relay.

### Refinements

1. *Two-speed Tuning*—This may be achieved by another small relay D, as shown in Fig. 4. For slow speed tuning a resistance R<sub>1</sub> is placed in circuit with the rectifier to reduce the current, so that relay D will not operate but B will. A resistance R<sub>2</sub> is included in the motor circuit by the relay D, and the motor runs slowly. The resistance R<sub>1</sub> is short-circuited by extra contacts on switch S when this is placed to "quick tuning." This causes relay D to operate and cut out the resistance R<sub>2</sub> in the motor circuit, thus allowing the motor to run quickly.

Fig. 5 shows a convenient construction of relay D. It consists of a coil C which attracts armature A. Contacts B are closed when A is lifted, and are opened by its weight.

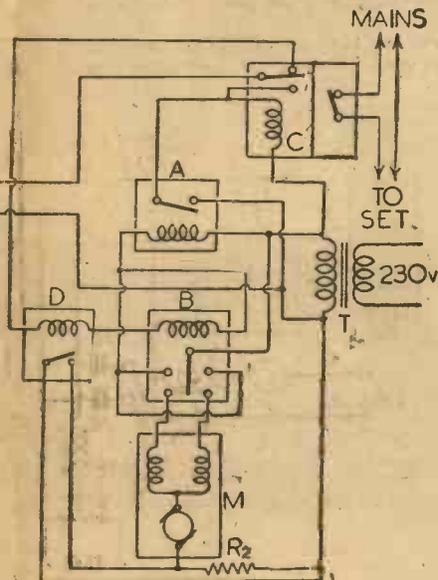
2. *Indication of operation on "On-off" relay "C"*—This is included in diagram A. Change-over contacts fitted to relay C are operated by the armature of this relay. A lamp L with suitable shunt resistance is placed in series with press-button K. Since only a small current is required to operate A the light will not glow but when the

# E CONTROL SYSTEM

## Operating Details of a Useful for the Experimenter

contacts on C change over, the larger current which flows through the coil of C also flows through the lamp, which will now glow. This also prevents the small contacts of relay A breaking the larger current of relay C, the current being broken by the press-button K.

3. Indication of position of tuning condenser.—One more wire will be required to operate the extension L.S. One of the other control wires is used for the other L.S. wire. The extra L.S. wire may be used to give remote indication of the position of the tuning condenser. (The L.S. extension must



slow-speed motor.  $M_1$  is the choke joined to P.

be of the high impedance type.) This is shown in Fig. 4. The potentiometer P is connected to a suitable D.C. supply and is rotated by the tuning condenser. Condensers  $N_1$  and  $N_2$  are blocking condensers of about 2 mfd. capacity.  $M_1$  and  $M_2$  are small L.F. chokes, and V is a voltmeter. The D.C. voltage used depends on the resistance of the chokes, and the current taken by the voltmeter. As the tuning condenser rotates, the voltage across the moving contact will change, and thus vary the reading of V, which can be suitably calibrated.

### Three-wire Control.

This is shown in Fig. 6. It consists essentially of two two-wire controls, with a common wire. The refinements are not shown, but may be in-

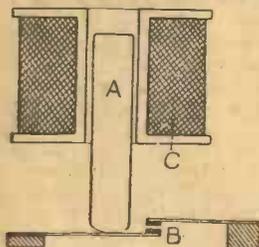


Fig. 5.—Showing the construction of relay D.

cluded exactly as in the two-wire system.

It gives the following controls:

1. Tuning. (By  $S_2$ .)
  2. Volume control. (By  $S_2$  and  $S_1$ .)
  3. Tone control. (By  $S_2$  and  $S_1$ .)
  4. On-off switching. (By  $K_1$ .)
  5. Wavechange switching. (By  $K_2$ .)
- Press-buttons  $K_1$  and  $K_2$  operate the

“on-off” relay and “wavechange” relay as already described. Switch  $S_2$  runs the motors in one direction or the other and switch  $S_1$  acts as a selector switch, to select to tuning, volume or tone control motors F, E and G respectively.

The system may at first seem rather complicated, but it gives full control, whereas most systems only give partial control. Also it requires no expensive apparatus as most of the relays can be made by the amateur.

Instead of a motor being used for tuning, a selector relay may be used to select to the push-buttons of a set.

No particulars as regards voltages, etc., are given, as these will depend on the types of relays used, and can only be found out by experiment.

The remote control points may be as numerous as required, and are wired in parallel with the other control points.

### Construction of “On-off” Relay “C”

Fig. 7 shows the construction of relay C. It consists of a laminated iron piece A (which can be made from old transformer stampings) with an armature B, pivoted at

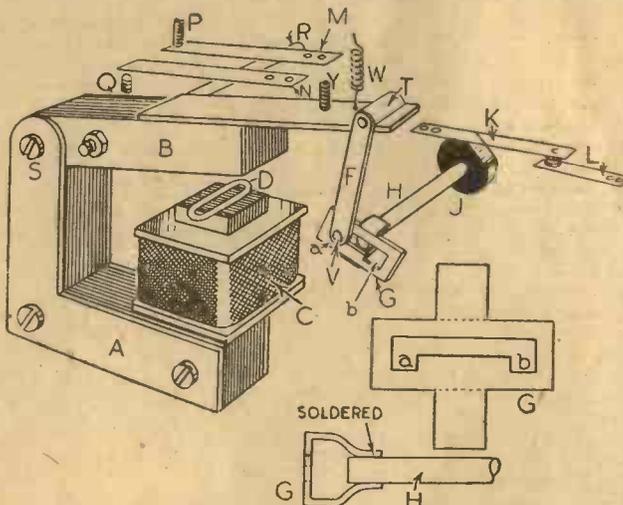


Fig. 7.—Details of relay C, showing laminations, and operating gear.

S. C is the operating coil, and D the “lagging ring” (a single turn of thick copper wire embedded in the pole face of A), to prevent the relay vibrating when used on A.C. (this may not be required). On to the extension piece is pivoted, at T, a brass strip F, provided with a pin V, which, slides in the slot in G. G is fixed to the shaft

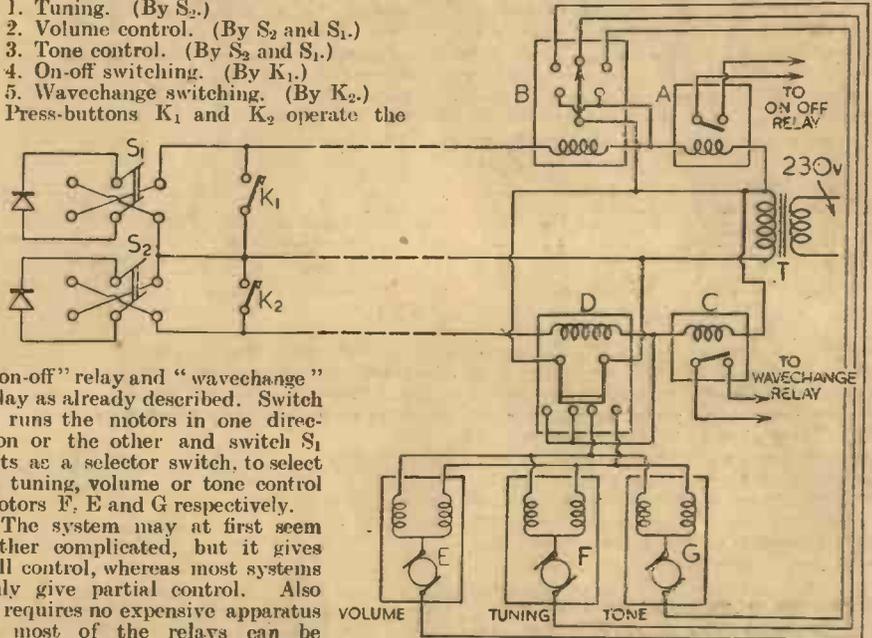


Fig. 6.—Circuit diagram of a three-wire remote control system.

H by solder, and operates a cam J, which in turn opens or closes contacts K and L. The armature is returned to the position shown by a spring W. When the relay is to give remote indication the change-over contacts M and P and N and Q are added, which are operated by an insulated rod  $R_1$ , which is fixed to B. These contacts are omitted if the relay is not required to give remote indication as described.

### Operating Details

When C is energised B is pulled down and the pin V fits into the cut out piece of G, marked a, and turns the cam J through about 60 deg., thus closing contacts K and L. On switching off the current, spring W lifts B up to the stop Y, and the pin V slides up to the slot in G, without rotating it. Next time the coil is energised the pin V fits into b and turns the cam back again, opening contacts K and L.

Shaft H must not be loose, but must be made fairly stiff, by spring washers, to prevent it rotating when the pin V slides in the slot in G.

This relay may be used directly as a simple “on-off” remote control relay, without any of the complications which are described in an A.C.-D.C. control system.



# Practical Television

June 17th, 1939. Vol. 4. No. 156.

## Another Big Screen Triumph

WHILE it is generally conceded that the big screen pictures which have been shown so far on the Baird cathode-ray tube equipment have been outstandingly good, there has been no pause in the research work which is aimed at securing greater clarity and increased brightness. It therefore came as no surprise to learn that for the showing of the Derby improvements had been effected in the tube manufacture, with the result that the pictures seen showed a marked increase in intrinsic brilliance when compared with the last occasion, that is the Farr-Burman fight. Not only were they more clear-cut and brighter, but viewers in the cinemas had the impression of a stereoscopic effect which made the horses and jockeys stand out in relief. Previous reports had suggested that at least six additional Gaumont British cinemas would be equipped for television picture rediffusion in time for the Derby, but this was not found possible. The temporary modification to the installation plans was due to the heavy requisitioning of both apparatus and personnel by the Baird unit in New York. These engineers are working day and night so as to have a fully-equipped demonstration theatre on Broadway in order to show the American television pictures. Other theatres are expected to be equipped soon afterwards. In this connection it is interesting to note that standard Baird television home receivers were modified to suit the American picture standards prior to shipment across the Atlantic. In spite of the absence of any test facilities for checking these alterations it was found on arrival in New York that the sets behaved splendidly. Reverting to the London cinema installations, in addition to those of the Marble Arch Pavilion and Tatler, the New Victoria also featured the Derby race, and in these three theatres alone a total of 5,000 people were able to watch the race in complete comfort.

## Removing Picture Patches

THE presence of flares or light patches in a television picture is always a source of annoyance to viewers, for they know that it is a transmission defect, and therefore no adjustment to the set controls can bring about an improvement. Many ideas have been propounded to eliminate or at least reduce this tilt and bend effect, but none so far appears to have been wholly successful. It is known that a limit is set to the magnitude of the picture signals generated by an increase in the electron beam current, for this brings about a liberation of secondary electrons which produce a space charge in front of the scanning beam itself. This causes the patches to appear, and it is noticed that there is a tendency for these to drift towards the centre of the picture from the outer edges. For this reason a proposal has been put forward whereby the mosaic screen itself is built up with a variable photo-electric and secondary emissive

response. The idea is to shade off the oxidised surface from the centre towards the edges of the signal plate, and it is claimed that this reduces materially the wandering effect of the flare patches.

## High Quality Sound

THE high quality of the sound which accompanies the B.B.C. television transmission has for a long time been the subject of very favourable comment. Anyone who compares the ordinary broadcast quality with that provided by the same programme radiated on the ultra-short waves cannot fail to notice the marked difference. Obviously, one of



Bobby Locke, the South African champion, met Reginald Whitcombe at Coombe Hill recently in a £500-a-side 72-holes golf match, which was televised. Our illustration shows operators rehearsing with a camera during the match.

the main reasons for this improvement is the extended frequency range encompassed by the signals, for according to published figures the modulated radio frequency output from the Alexandra Palace station has an overall frequency response which is sensibly uniform from 10,000 cycles right down to 40 cycles. In addition, however, the harmonic distortion has been brought to a very low level indeed, for the second harmonic content does not exceed .05 per

cent. for 100 per cent. modulation, while under the same conditions the third harmonic content is about .01 per cent. It is this very low odd harmonic content, in addition to the extended frequency range, which is said to be responsible for the high quality of the sound transmissions.

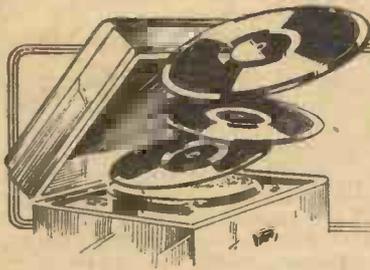
## A Survey Report

THE Americans are very fond of undertaking surveys and issuing reports dealing with scientific and other matters, and one of the latest to be carried out deals with television, and was submitted to the major film executives of the United States by the Hays organisation. It is recognised that in so far as the cinema is concerned, the main problem is associated with the equipping of large screen projectors, although there is a hint that any ordinary television service to the home may bring about a fresh outlook on entertainment, and would affect cinema attendances. To offset this, the suggestion is put forward that certain frequency bands should be set aside for theatre transmissions only, and that these should be outside the public broadcasting band so as to prevent a home receiver from being tuned to these transmissions. The report goes on to state that the radio industry in that country does not want to develop television, and this is in striking contrast to the determined efforts being made by the radio manufacturers in England who are exerting every effort in their power to extend the service into the provinces, and so augment set sales. Apparently it is felt that across the Atlantic the public will not be content with blind listening once television is successfully demonstrated. Although full of scepticism, and comment is made on the tremendous technical and financial difficulties ahead, it is significant that the report states that this industry will be well established in America by the spring of 1940 or 1941.

## Television and Films

THE problems confronting the television technician were very ably dealt with recently by M. P. Dorte, of the B.B.C., when he gave a lecture to the Association of Cine Technicians. He explained the arrangements which have to be made for outside broadcasts, and showed how they differed from those undertaken for news-reel services. It was pointed out that with all these actuality broadcasts, especially if it is a fight or a match where the result is unknown, provided the subject matter is

(Continued on page 328)



## Impressions on the Wax

### A REVIEW OF THE LATEST GRAMOPHONE RECORDS

**P**RACTICALLY everybody was sorry when the B.B.C. announced the finish of "Band Waggon," that great little show that became a weekly attraction. Fortunately, the last programme, which was made up of earlier Band Waggon days, was recorded (by permission of the B.B.C.) on three double-sided H.M.V. records, which provide twenty minutes of high-speed fun. "Big-hearted Arthur," "Stinker," Syd Walker, and the Bagwash family will live again in your home. "Chestnut Corner," "Aunt Jessie's Chest," and the Askey-Murdoch organ duet will entertain you. The three records, in their illustrated portfolio, cost 6s. 6d.—*H.M.V. BD 693-5*.

Most people have seen Joan Crawford on the screen, but how many have heard her recorded voice? Accompanied by the M.G.M. Orchestra, she sings "I'm in Love with the Honourable Mr. So-and-so," from the film "Society Lawyer," and "It's All So New to Me" on *H.M.V. B 8909*.

Jack Hylton's two greatest successes are the stage version of "Band Waggon" and "Youth Takes a Bow."

The latter has been squeezed on to one 12in. record—*H.M.V. C 3103*. With Hylton's band to supply the music, Bryan Michie introduces several of the brilliant youngsters unearthed by the band-leading impresario of jazz.

#### A New Crosby

**A** NEWCOMER to the H.M.V. list this month is Dick Todd, who can be called a vocal double to Bing Crosby. In co-operation with "The Three Reasons," a fascinating trio of girls' voices in close harmony, he sings "Deep Purple" and "Little Sir Echo," the latest hit song from America, on *H.M.V. BD 699*, and "I'm Building a Sailboat of Dreams," coupled with "I Can't Get You Out of My Mind," on *H.M.V. BD 705*.

Perennial favourites with all lovers of light music are the Savoy medleys arranged by Debroy Somers when he was in charge of the dance music at the Savoy Hotel. The New Mayfair Accordeon Band has recorded the Savoy "American" and "English" medleys on *H.M.V. BD 698*.

Artie Shaw, the leader of America's most popular swing band, who has been lying at death's door—he is suffering from malignant leucopenia, a rare and usually fatal disease of the blood—is now out of danger. His latest record to be issued over here contains "Deep Purple" and "Begin the Beguine." The latter title comes from the satirical Cole Porter show, "Jubilee," which was produced in America in 1935, and which, obviously, will never be produced in England. The tune is based on a very old Creole dance song from New Orleans—*H.M.V. B 8906*.

From opera and oratorio in English Webster Booth turns to two of the most popular film songs—"One Day when we Were Young" and "Sweethearts" on *H.M.V. B 8899*.

Maxine Sullivan, the coloured singer,

has recorded Cole Porter's "Night and Day" and Gershwin's cynical "It Ain't Necessarily So" on *H.M.V. B 8911*, whilst specially released last month was a record by Will Glahe and his Orchestra of the overnight success "Beer Barrel Polka." In case you missed it, it is coupled with Will Glahe's own "Goosey, Goosey" on *H.M.V. B 8910*.

Funny records are few and far between. Listen to the dry Scots humour of Dave Willis on *H.M.V. BD 703* and Max Miller's impudent cockney wit in numbers from his film "Everything Happens to Me" on *H.M.V. BD 697*.

Finally you must not miss swing's latest innovation. The same number played by a different band on each side of the same record—"Sweet Sue," played by both Benny Goodman's and Tommy Dorsey's Orchestra on *H.M.V. B 8905*.

#### Decca

**M**YSTERY surrounds the identity of Renara, the brilliant girl pianist whose name appears in the June Decca list. All that I can tell you is that her name is a famous one in the world of classical music. On *Decca F 7502* she has taken "Mexicali Rose" and "A Violin in Vienna," and built up on them her own variations.

Bebe Daniels and Ben Lyon have made two new records this month. The first contains "Little Sir Echo" and "The Masquerade is Over," *Decca F 7063*, and the other "Deep Purple" coupled with "A Little Swiss Whistling Song"—*Decca F 7046*.

With a love of military music that dated from his childhood in civil war days, John Philip Sousa became the leader of the first military band to go on tour. From end to end of the American Continent; round Europe four times; once round the world on a 14-months' tour, Sousa introduced his compositions in march time. A new album release contains ten of the most famous of these—*Decca 7010/14*.

Charlie Kunz plays a selection from "The Great Waltz" on *Decca F 7051* and a popular medley on *Decca F 7060*, whilst Louis Armstrong swings his sermon as the Revd. Satchelmouth on *Decca F 7056*. He takes as his text "When the Saints go Marching By."

#### Parlophone

**V**ICTOR SYLVESTER and his Ballroom Orchestra have made strict dance tempo recordings of "Kinda Lonesome" (slow fox-trot), from the film "St. Louis Blues" and "Could Be" (quick-step) on *Parlophone F 1378*, "Sweethearts" (waltz), from the film of that name, coupled with a quick-step "Where is our Blue Bird of Melody Lane," on *Parlophone F 1379*.

If you like pianoforte solos then you are well catered for by Billy Thorburn with a fox-trot medley and quick-step medley on *Parlophone F 1380* and Gerry Moore with "Between a Kiss and a Sigh" and "Shut-Eye," on *Parlophone F 1381*.

## ● AROUND the SALES

### BARGAINS worth SECURING

Many "Practical Wireless" readers have asked what is best to buy to meet particular requirements. A repeat of some previous recommendations is not amiss, so here goes.... Remember, avoid disappointment by ORDERING EARLY.]

Firstly, a really stupendous bargain which aptly describes this special valve offer. To pay only 5/6 for 3 new 2-volt valves—standard U.S.A. types in fact—together with 3 valveholders, data and diagrams, is to pay a fraction only of the real list price. Order NOW is really sound advice. Obtainable, by the way, only from N.T.S. and sent POST FREE!

I've stated before, in view of the importance of the short-waves in regard to communications and entertainment the N.T.S. Bandsread 4 Kit at 49/6 is still worth recommending as an amazing bargain. Recommended for loudspeaker and 'phone reception. You obtain it complete with coils for 12-94 metres and FREE valves and the easyway deposit with order is only 3/6.

Do you know you can get a pair of lightweight headphones for 3/6 (post 6d. extra)? or you pay nothing for these if you order the N.T.S. 1-valve short-wave kit at 27/6, complete with coils as above, valve and all parts; 'phones are given free, 2/6 only is the easy payment deposit.

YES!—your best chassis "buy" is still the N.T.S. 6-valve All-mains All-wave model at 6 gns. The way-range is 18 to 2,100 metres, it has illuminated station scale and pick-up sockets, and is an exceptional bargain for those who want to replace their old set. Guaranteed 12 months and to secure, you merely send a 5/- easyway deposit with your order. Buy this and be satisfied completely, is best advice. Here are some more amazing N.T.S. chassis bargains. An all-wave battery S.G.3 chassis, new, complete with S.G. Det. and Pentode valves at 65/- or 5/- deposit with order. Also, a Class "B" 4 (with valves) at 59/6, an A.C.4 (with valves) at 55/-, and an All-Wave A.C.4 chassis, complete with valves, at 79/6, or 5/- down and 15 monthly payments of 6/6. Thousands of these chassis have been sold of late. Send now for valuable complete list.

Worth while component bargains, note these: Bar-type .0005-mfd. brightly plated 2-gang condensers with trimmers, 2/3, 4 assorted and useful screened and unscreened coils 2/- only. Sensitive pick-up unit (well-known make) with arm, rest and screened lead, brand new, a bargain at 6/6. The N.T.S. Bargain Parcel, lately advertised I believe at 6/6 post free, represents an exceptional opportunity for all "Practical Wireless" readers.

Don't miss those World All-Wave Kits. As stocks have been plentiful they've been offered quite a lot of late. On good authority, however, these kits won't last much longer. The 3-valve SG Pentode model is marked down at 29/6 and the super 4-valve model at 42/-. Have a look at some previous N.T.S. announcements and choose your kit now. You'll be more than pleased.

MR. CAMM'S special report on the popular Pentakit helped many readers to decide on this marvellous bargain. It builds 1, 2 or 3-valvers for 9-2,000 metres, or efficient short-wave adaptor or converter. The complete kit with steel chassis, self-locating coils and 3 British valves is priced at 42/- or 2/6 down and 12 monthly payments of 3/9.

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## PRACTICAL TELEVISION

(Continued from page 326)

satisfactory then viewers will overlook an indifferent technical quality. This reasoning was not put forward as an excuse or an indication that steps to improve the technical quality will not be undertaken with every vigour, but rather to show the difference in mental make-up when an audience is watching television, and when the same people see a film where first-class quality is expected. It was emphasised that the cinema industry desired to make use of the B.B.C.'s outdoor broadcasts, and by the same token television does want films. The hope was expressed that the needs of both sides would be fulfilled, and this sentiment is echoed by all those who have the interest of television's development at heart. A really worthwhile gesture by both sides would do much to clear the air, and make for a spirit of co-operation. Cinema rediffusion would then pass from the term experimental, which the B.B.C. still insist

on using, to a commercial product of no mean magnitude.

### Large Screen Queries

THE plans for the installation of big screen-equipment in various London cinemas, with the prospect of an extension to the provinces, once the Government have made up their minds concerning the one or more stations which are to operate both in the Midlands and the North, have raised a number of questions concerning the operation of the apparatus in its one or more forms. Naturally, the ultimate aim, at least as far as the cathode-ray tube projection apparatus is concerned, is to house the apparatus in the projection box, where it will be under the direct control of the film machine operators. How long development will take before this important step is possible cannot yet be stated, but the difficulties seem to be chiefly optical. The controls are not more difficult to handle

than those of a standard film projector, although it would seem preferable to judge the degree of contrast from the body of the theatre, instead of inside the box, in just the same way as the volume of sound is standardised in cinemas now. Local authorities appear to be quite satisfied with the fulfilment of all the safety regulations, for the L.C.C. ones are among the most stringent in the whole country, and these are adhered to by the cinema installations already undertaken. Even the question of incombustible screens has been met in spite of the precautions necessary to secure adequate brightness by a special treatment of the screen surface. There seems little doubt, therefore, that the projectionist of the future, once he has become familiar with the essential principles of television, will not find it difficult to operate and service where necessary the big screen apparatus now being designed for cinema use.

# TELEVIEWS

### Standardising Kinematograph Terms

CLOSELY following the television industry's effort at standardising terms and definitions comes the news that the cinema industry is aiming at securing an authoritative glossary of terms in its own sphere. This has come at a very opportune moment, and a very representative technical committee has been formed to finalise the lists which have already been circulated. To give some idea of the extent of the ground to be covered the following headings can be mentioned: The cinema and its operation, the studio, production, photography, printing and processing, cinema and studio sound, television, colour work film, manufacture, etc.

### America is Behind

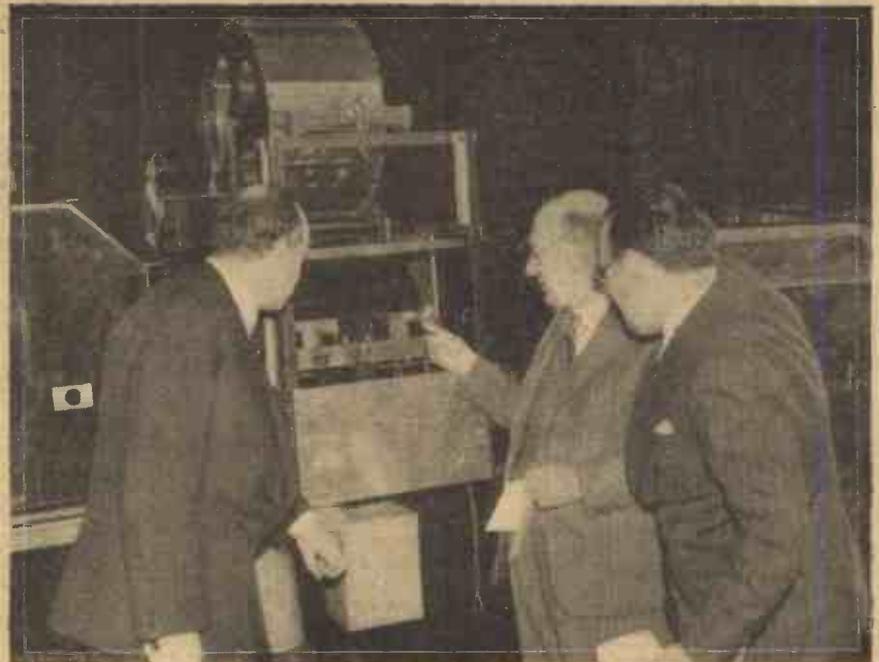
NOW that the various radio manufacturers in the United States have made known their television-receiver plans, it is rather remarkable to find how many of the set models use very small cathode-ray tubes. It is quite common to see a specification for a 24-valve set, and yet the picture tube has a diameter of only 5in. For home-constructor kits, which the Americans are also sponsoring, the 3-in. and 5-in. tube is no doubt an admirable component. Convenience of assembly because of its small size, lower scan voltages, and cheapness, are essential factors for consideration where a set has to be assembled at home, but surely these factors should not rule in a complete commercial product. For consistent home viewing the very small television screen has its drawbacks, and a minimum size of 9in. is becoming very popular in this country. To see the illustrations of American sets, and read details of their features gives the impression that the design is an all-wave console with the television section added as an extra sales inducement. Experience here has shown that this is the wrong method of approach. Viewers buy a television set which may or may not have all-wave radio as an additional amenity, and unless the American psychology is very different from the English, manufacturers over the water will soon have to change their tactics. Perhaps the relative paucity of transmission times has had some influence on this outlook, for the signals are still experimental, and no commercial licence for advertisement

revenue-earning purposes has yet been issued by the Federal Communication Commission.

### Two Forms

IT is not always recognised that the modern electron microscope, which undoubtedly owes its existence to electron optical research for television purposes, can be divided into two main types. In the first there is usually a low degree of magnification, and an image of a cathode surface, which is electron-emitting, and on which the subject to be examined is focused optically, is electron optically focused on to a fluorescent screen for observation either visually or photographically. It is this principle which can be made use of for the purpose of examining the surface of the cathode in a standard

form of cathode-ray tube. To carry this into effect a proper inter-adjustment of the first and second anode potentials has to be made so that an image of the cathode can be projected on to the front screen and enlarged where necessary. If a magnetically operated type of tube is to be used in this manner, then the modulation electrode becomes the first anode, and has a positive potential applied to it so that it gives the electron focusing system in conjunction with the normal single anode which characterises these tubes. Magnification is brought about by altering the direct current flowing through the external solenoidal focusing coil. With the second form of microscope the electron beam furnished by the radiation from the hot or cold cathode is used to irradiate some completely independent object whose form can be defined on a remote fluorescent screen or photographic plate. The glass lenses are, of course, replaced with their electron optical equivalents, and the electron beam takes the place of the light rays.



Scophony, famous for their large-screen television system used on recent big sporting events, held their Annual General Meeting at their London offices at Campden Hill, recently. Our illustration shows Oscar Deutsch explaining points of a Big-screen Cinema Receiver to Sir Maurice Bonham-Carter (left), the Chairman, and Mr. S. Sagall (right) the Managing Director, at the General Meeting.

# Broadcasts to Schools

It is interesting to note that the annual programme of Broadcasts to Schools, recently issued by the B.B.C., contains, in addition to details of the various series to be broadcast between September, 1939, and June, 1940, three short articles of major importance. The first is entitled "The Contribution of School Broadcasting" and is designed to illustrate how, in the present rapid state of educational development, the microphone can assist and amplify existing schools curricula.

This outline of theory is followed by its practical application described in "Class-room Use," in which experienced advice is given on preparation for the broadcast, actual listening and revision once the programme is over. "Problems of Installation and Reception" are then dealt with, and finally, particulars of "Pamphlets and Registration" are provided. Details are given of how a school may register with the Central Council for School Broadcasting and the privileges it will obtain by doing so, and of information relating to the constitution and composition of the Central Council.

## Increase in Numbers

The number of registered schools during the past year has increased from 8,250 to 9,759, and this increase has been general throughout the different types of schools. Two-thirds of the total number of approved secondary schools in England and Wales are now registered and very nearly one in every four of the elementary schools and departments are also listed with the Central Council.

## Physical Training Series

The programme for September, 1939, to June, 1940, follows closely the lines of its predecessor. The physical training series will continue throughout the year. Co-operation with Scotland has been carried a step further; first as an experiment for one year, the Junior Geography series which has been planned in Scotland will be taken by the English schools, where it will be known as "Travel Talks." Secondly in Biology, the series entitled "Our Daily Life" will be the first of a new two-year series to be taken by both English and Scottish schools. The series will be given by Professors Peacock and Garry, who are well known to English schools.

A further innovation will be a new course for rural schools. The new series, "Let's Build a House," will introduce schools to the various matters to be taken into account in planning, building and furnishing a house in the country, and it is expected that they will form the basis of much practical and other work in the schools.

Series for seniors include, in Geography, "Migrant Men Seeking New Homes," in which the three terms will cover America, Asia, Africa and Australasia; British History, which will be planned round the central theme of "Our Civil Liberties"; and History in the Making, which will consist of talks concerned with modern problems intended primarily for boys and girls in their last year at schools.

## Feature Programmes

Topical talks and feature programmes for senior pupils will be divided into three

main groups: "The World at Work and Play," "The World of Art," and "The World of Science and Discovery." As before, talks for sixth forms of secondary schools and a series for seniors on "Science and Gardening" will be included in the programmes.

## World History

Plans for juniors include, in English, plays, stories and poems with a special appeal to children between nine and eleven years of age. The series of travel talks will be concerned with the British Isles. World History, again for juniors, will deal, in the first term, with the ancient civilisations to the age of the Vikings; in the second, with the cultural conquests from the Middle Ages to the eighteenth century; and, in the final term, with modern times.

## Music Broadcasts

Anne Driver will continue her courses on "Music and Movement," one for infants and one for juniors. Other music broadcasts will consist of a series entitled "Early Stages in Music," for juniors and seniors, by J. W. Horton, which will alternate with a series of Preparatory Concert Lessons, by J. W. Horton, for juniors and seniors. A series of Concert Lessons for seniors by Dr. Armstrong, organist and lecturer in music at Christ Church, Oxford, will be broadcast in collaboration with Herbert Wiseman, Director of Music in Edinburgh Corporation Education Committee.

Five series of modern language broadcasts will be included: Early Stages in French, Early Stages in German, Intermediate German alternating with German for Sixth Forms, Intermediate French, and French for Sixth Forms.

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# Programme Notes

## Theatre Royal, Bristol

THE Theatre Royal, Bristol, is the oldest theatre still standing in England: it was built in 1766 by the enterprise of a number of Bristol citizens. A programme telling its history has been written by Wilfrid Rooke Ley, and "Theatre Royal, Bristol" will be produced by W. Farquharson Small on the Regional wavelength on June 23rd, and on the National on June 24th. From this theatre, Mrs. Siddons proceeded to her first triumphs at Drury Lane; in the nineteenth century every actor and actress of note performed there at one time or another, and there also three of the greatest actresses of more recent times made their first appearance—Lady Bancroft, Mrs. Kendal and Ellen Terry.

## General Release

GORDON CRIER compères one of the "General Release" programmes of songs from current films. It has been arranged by Reginald Burston. On this occasion Mr. Burston will not be available to conduct the Midland Revue Orchestra, and his place is being taken by Norris Stanley, its leader. The vocalists are Diana Morrison, John Bentley and the Rhythmettes (a trio of women's voices). Diana Morrison formerly broadcast from London in "Monday Night at Seven," and in a series of sketches with Hugh Wakefield. She has recently come to Birmingham with her husband, John Ellison, who joined the Birmingham Repertory Company last year; and she made a hit in the recent Midland broadcast revue, "Time Stagers On."

## "The Ballad-Monger" Roundabout

MIDLAND contributions to "Roundabout" during most of June take the form of a revival of the ballad in a series called "The Ballad-Monger." It is on lines similar to the series entitled "Songs for Sale." The singer chosen as "Ballad-Monger" will present his wares, which will include three English ballads of the type which the Victorian era loved, and one modern ballad. The singers will include Raymond Newell, Eveline Stevenson and Geoffrey Dams. The two last-named first broadcast from the old Birmingham station at Witton in 1922, the first year of broadcasting.

## Newcastle Town Moor Fair

WHEN the Town Moor Fair sets itself up once again for Race Week at Newcastle-on-Tyne, the thousands of visitors to this fun-town of tents and caravans will include Victor Smythe and Richard North, who will have a crew of engineers and a recording van with them. These experts will be paying the visit in order to bring to Regional listeners, on June 22nd, a recorded sound-picture of the fair, including the noises of the crowds and the "barkers" and the roundabouts. The microphone will go among the throngs, into sideshows and booths, so that the listener at home may "overhear" the proceedings and may, by radio and with the help of interviews, share in several of the amusements. The broadcast will be called "All the Fun of the Fair."

The Regional Children's Hour on June 22nd will also take listeners over to Newcastle Town Moor Fair. In this programme young listeners will be able to "accompany" Victor Smythe and Richard North as they enjoy all the fun of the fair, and watch the children there enjoying it, too.

Last year, it may be remembered, Richard North went sliding on a mat down the helter-skelter with a microphone in his hand, while he and Victor Smythe were at Town Moor making broadcasts similar to those to be given this year. An engineer at the top of the slide swiftly paid-out the cable to which the microphone was attached, while Richard North described his sensations as he shot down to earth on the polished, twisting run.

For the benefit of those who have never visited Newcastle's annual Town Moor Fair or heard one of the broadcasts from it in recent years, this is perhaps one of the biggest festivals of its kind in the world, and during the week it takes place some forty acres of the Moor are occupied by a temporary town of huts and tents, stalls and caravans. Very many large roundabouts are usually to be seen there, as well as circuses, boxing shows and about two hundred round-game stands. On one occasion in recent years the final Saturday night attendance at the Fair was estimated at a quarter of a million.

## Round Britain

LISTENERS are invited to take a musical journey by radio with H. V. Morton, journalist, author and authority on the countryside of Great Britain. He will describe the "tour," which will be made in the company of The B.B.C. Theatre Orchestra, with Ernest Butcher, John Tainsh and Harold Williams as soloists. As readers of his books will testify, Mr. Morton has a rare gift of describing town and country.

Beginning in London, listeners will be taken to the Home Counties, Midlands, North Country, Scotland, Wales, and back to London. Generally the folk music of each district visited will be featured, but music will also be introduced which has been inspired by the various districts. The folk songs will be sung by Ernest Butcher, Harold Williams will be heard in English songs and particularly "The Floral Dance," while John Tainsh, Scottish tenor, is coming specially to London from Edinburgh to sing the Scottish numbers.

## Plays This Summer

TWO important serials are contained in the Drama Department's schedule for July to September next. The first, "The Sword in the Stone," is adapted by Marianne Helweg from a recently published novel by T. H. White. It will consist of a series of incidents, each complete in itself, connected in a charmingly fantastic way with the early boyhood of King Arthur.

The second is A. E. W. Mason's "The Four Feathers." This famous adventure story was recently turned into a successful film, and Peter Creswell, who is adapting it and will be the producer, has come to an arrangement with the film company concerned whereby they will provide him with much material in sound, recorded by them in the Near East.

Thrillers will include a revival of Edgar Wallace's "On The Spot," "The Corpse on the Bridge," by Charles Barry, and an adaptation of Graham Greene's well-known novel, "A Gun for Sale."

In more serious vein, "The Apple Tree," by Galsworthy, Thomas Becker's "The Shoemaker's Holiday," and plays by Horton Giddy and Denis Constanduros are included in the schedule.

## MAILS FOR IRAQ

THE Postmaster-General announces that, in extension of the arrangements already in force whereby all first-class mail (letters, letter packets and postcards) for Empire destinations in East and South Africa, India, Malaya, Hong Kong, Australia, New Zealand, etc., and for Egypt, is forwarded by air as the normal means of transmission, the arrangement will be extended to Iraq and Kuwait after the despatch by surface route to Iraq as from Saturday, May 20th.

On and after May 21st, the postage rate for letters and letter packets addressed to Iraq and Kuwait will be 1½d. per half ounce and for postcards 1d.

Printed papers, commercial papers, samples, and parcels will still be forwarded by surface transport at the existing rates of postage for those classes of correspondence.

The air mail service to Iraq, for which a special air postage rate of 3d. per half ounce has hitherto been payable, has been discontinued after the despatch from London on the evening of Saturday, May 20th.

There will be five services a week from this country to Iraq and Kuwait and first-class mail should be delivered in Baghdad and Basra in about three to five days, as compared with six to seven days by the former surface transport services.

## A HOUSEWIFE'S LAMENT

GIVE me my pen and my blotter,  
Give me some ink and a stamp;  
Act while you're warm is my motto,  
Iron while the washing's still damp.

I have made up my mind I must enter  
The ranks of those people who write  
To the B.B.C.'s recognised centre,  
To complain that the programmes are trite.

My dear B.B.C. (I am starting),  
In making this protest I feel  
From the well-trodden paths I'm departing,  
But my grievance is none the less real.

I accuse you of making the Wireless  
A darn sight too sweet on the ear—  
If only we might have an hour less  
Of programmes I simply must hear.

I haven't got time to go shopping  
Because I might miss Rhoda Power;  
My stitches I'm constantly dropping,  
So beguiling I find Children's Hour.

There is food which is ready for cooking,  
And letters I really should write—  
But how can I bear overlooking  
One feature of In Town To-night!

Mr. Middleton stops me from reading,  
Doris Arnold interferes with my meals;  
If I mend I may find I'm not heeding  
The words of the Weekly Appeals.

Is it right to present Henry Ainley;  
Or Dunsany broadcasting a play  
While the crocks in the sink linger vainly,  
And the moments pass swiftly away?

Gram Swing keeps me up on my bath night;  
George Nash counters Sabbath Day prayer.  
I can't keep the brass on the hearth bright  
If the Black Dog is taking the air.

I must skip around with Ann Driver;  
I hate to miss Ambrose or Flomo;  
It's so hard to remember that I've a  
Duty I owe to my home.

In this welter of wonderful matter,  
How is a poor housewife to choose  
When it comes to preparing a batter  
Or imbibing the Six-o'clock News?

And so, B.B.C., ad finitum,  
I'd beg on my knees if I could,  
That so far from improving your items  
You don't make them a quarter as good!

FRANCES COLLINGWOOD.

**AERIAL EQUIPMENT AND INSTALLATION**

(Continued from page 315)

length. Various special types of aerial are available to the transmitter, but many of these may be applied to receiver technique. A scheme not often used by the listener, but one which has many valuable points in its favour, may be used where a sloping roof covers a loft, a support for the aerial then being placed on a convenient chimney stack and the lead-in being anchored to an insulator of the lead-through type fastened to a slate or tile on the roof. This should be chosen so that the wire attached to the inside will run direct to a similar insulator fitted to the ceiling, when it may be taken straight to the receiver, all portions of the aerial thus being rigid and at the same time short. The tiles may be drilled with an ordinary twist bit, although it calls for two people to attach the insulator, one holding the inside portion whilst the outer is attached. The type of insulator is illustrated in Fig. 6 and is quite watertight, although additional protection may be provided by placing a piece of rubber (cut from an old motor-car inner-tube) on each side. Where

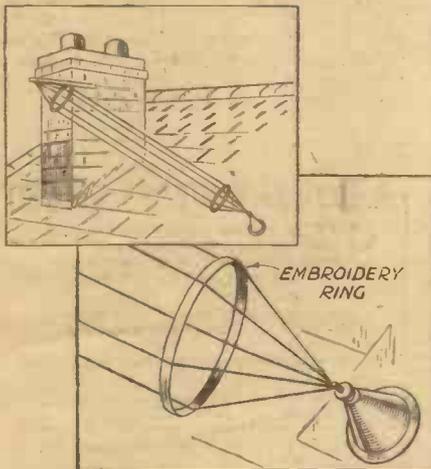


Fig. 6.—Another useful aerial design for listeners with limited garden space. This idea is also useful for leading-in purposes.

no garden facilities of any kind are available, a "sausage" aerial may be suspended between chimney stacks and a lead-in of the same design anchored to a slate insulator, as shown in Fig. 6. The discs holding the wires may be cut from ebonite or the small wooden or, better still, cane embroidery rings sold at haberdashery stores may be used. These may be drilled easily and the wires threaded through, a little Chatterton's Compound or other material being used to hold the wires in place. The additional amount of wire used by these schemes will give better signal strength, and the directional properties of the aerial may prove an advantage over the results obtained with the standard "elevated capacity" type of aerial.

**Wall Aerials**

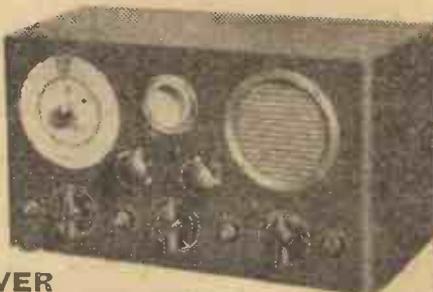
Finally, for those with restricted space the suspended wall-type of aerial should not be overlooked. The Bulgin insulators already referred to enable a rigid wire to be held clear of a wall and with many short-wave or all-wave receivers these will be found to offer better results than long horizontal aerials, whilst the fact that they are non-directional is often a boon in removing interference from a local station. The insulators should, of course, preferably be mounted on wooden struts.

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**D.C. CHARGERS.** Davenset D.C.2 2 circuits 1 and 3 amp., or 2 and 6 amp., with meters and plated control wheels, 28/10/-.

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# LETTERS FROM READERS

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication.)

### Station DX222A (New Zealand)

SIR,—I have recently received a card and a letter from R. A. Roycroft, 21, Anzac Road, Whangarei, N.Z. (DX222A), who says he would very much like to hear from S.W.L.s in Great Britain and will QSL 100 per cent.

I would be interested to know if any readers of PRACTICAL AND AMATEUR WIRELESS have logged a station, the call-sign being 4 PM, located at Port Moresby, New Guinea.—F. WILLIAMS (London, S.E.24).

### Logged on the Prefect S.W. Three

SIR,—I was pleased to see my log of DX heard on the Prefect S.W.3 published in PRACTICAL AND AMATEUR WIRELESS recently. Since then I have added a pentode output, in place of the power valve, and have obtained even better results. Readers may be interested in the following log heard on evenings April 12th to May 16th. Aerial 20ft., inverted-L facing N.-S.

TY2BH, 4TJ; TI2HP, TG5JG, YV4AC, LU7AG, 4EZ, 2HA, 7BC; PY4CT, 2HV; HH2D, CO60M, CX2CO, 1AA; CE3AT, ZP6HF.

W1BK, JMG, QG, AJZ, BML, BLO.  
W2IHS, XY; W4CQG; VE1CR, 3LF, 3AT.

VU2FA, FNIC, KA1ME, 3KK; VP3CO, VQ2CM, VK4PF (my best so far), FA3HP, 3FB; CT2AB, ZB1L, 1E; SV1MP, 1CA, and 30 other Europeans. My best catch on the commercial bands at present is XGOY, 25.26 m., which I can pick up easier than some of the Americans.—E. ANDREWS (Brighton).

### A Car-radio Set!

SIR,—With reference to the letter from W. G. R. Bowden on the above subject, I too would welcome an article giving a design for such a set run entirely from a 6-volt battery, and using 6-volt valves. I run a set with 2-volt valves and have recently considered writing to you for advice on how I could use 6-volt valves and so do away with the separate 2-volt accumulator for the filaments. Besides, I consider I could get better quality and that's what I want.

I would like the set to be so constructed that it need not necessarily always be installed in a car, but could be taken out—say in the winter, and used indoors.—T. W. BRETT (Plymouth).

SIR,—I heartily agree with the remarks of W. G. R. Bowden (Bromsgrove) about a car-radio. May we have one using 2-volt valves (I can tap my 6-volt car battery) and a separate H.T. battery. Some of us have a number of unused parts, and valves, and a car radio made from them would be a great boon.—F. L. GOULD (Hovingham).

SIR,—Referring to your correspondent's letter, "A Car-radio Set," I think your reader's suggestion an excellent one.

A three or four-valver would be ample, and it should preferably run from a 6-volt car battery; those who have cars with 12-volt batteries can then tap off six volts.

During the past 18 months I have been a regular reader of PRACTICAL AND AMATEUR WIRELESS and have found it extremely helpful in smoothing out "technical hitches"!

I would like to correspond with any readers in any part of the world or change cards with any S.W.L., A.A. or full ticket, and I promise to answer every letter.—DON W. HOWARD, "Chebbard," Church Road, Broadstone, Dorset.

### A 14 mc/s Log

SIR,—I enclose my 14 mc/s 'phone log for last month. All reception was on a home-built 0-v-1 with a 35ft. inverted L aerial, pointing N.W.—S.E.

Asia.—VU2FA, FNIC, ZC6ES.

Africa.—VQ2CM, 3CRE; ZEIJA, 1JS, 1JH, 1JF; ZSIS, 1D, 1Q, 2B, 2BZ, 2DV, 5Q, 5AB, 6DY, 6EJ.

N. America.—CO2LY, VP3CO, 4TC, 6FO, 6MY.

S. America.—PY1GR, 2BH, 2GC, 3EN,

### CUT THIS OUT EACH WEEK

## Do you know

—THAT coils may be matched by moving the end few turns so as to modify both inductance and capacity.

—THAT the gain, and thereby the noise level, of a short-waver may be controlled on the L.F. side.

—THAT one simple means of carrying out the above idea is to vary the voltage on the screen of the output pentode.

—THAT the angle at which a gramophone pick-up travels across the record will not only control the wear but also the frequency response.

—THAT it is often advisable to place a variable component back on the baseboard or chassis and control it through an extension spindle.

—THAT in stormy weather it is often advisable to short-circuit an air-dielectric series-aerial condenser.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

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4CT, 4FI, 4GC, 4PA, 4BL, 6AG; LU5CO, 5IZ; CX2CO; H1IL.

Oceania.—KA1CS, 1FH, 1HS, 1ME, 1CF; PK1OG, 1BY, 2WL; VK2AGJ, 4KS, 4PT, 5JT.

I would like to correspond with any reader anywhere interested in amateur radio.—L. STRETTON, 74, Raleigh Street, Nottingham.

### Correspondents Wanted

SIR,—I would like to get into touch with any short-wave enthusiast residing in my district.—R. BURGESS, 6, Viola Square, Wormholt Estate, Shepherd's Bush, W.12.

SIR,—I have been a regular reader of your interesting paper for about two years and would be very glad to get in touch with readers in any part of the world who would like to correspond with me.—FRED BURNS, 31, Edge Fold Road, Walkden.

SIR,—I have been a regular reader of your fine paper, PRACTICAL AND AMATEUR WIRELESS, since I first started to study wireless telegraphy, and I find your paper an excellent guide. I have been studying wireless telegraphy for eight months, and I am at present building a short-wave set with the help of your Handbook.

I would be very pleased to get in touch with a correspondent who is interested in wireless telegraphy, and who is a regular reader of PRACTICAL AND AMATEUR WIRELESS.—WILLIAM WAUGH, 15, Bank Street, Greenock, Scotland.

### Station HZA.

SIR,—With reference to a paragraph included in "Leaves from a Short-wave Log" in PRACTICAL AND AMATEUR WIRELESS dated June 3rd, I was interested to see that a reader had picked up a station giving HZA as its call-sign. I also received a similar call, but owing to the QRM I was unable to hold the station in order to distinguish all that was spoken. I received stations on Sunday at about 00.15 G.M.T. giving calls OQ5AA, EK1AF and HL8Q. All these were heard on the 20-metre band. I should be interested to know if there are any such stations as I cannot find them in any list. I would like to correspond with any other "ham" or radio-enthusiast anywhere in the British Empire about my own age—19 years.—FRED BURNS, 31, Edge Fold Road, Walkden, Manchester, Lancashire.

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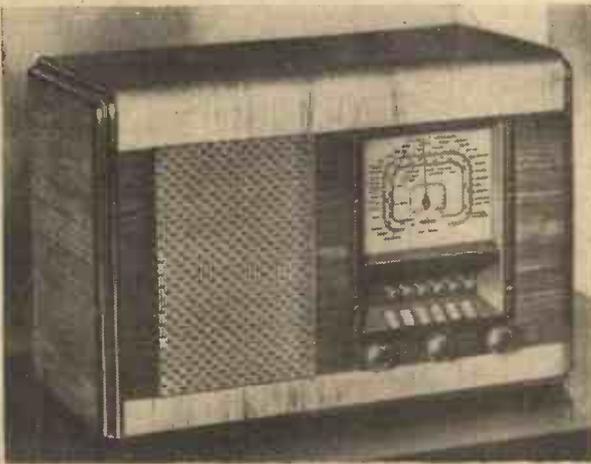
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# NOTES FROM THE TRADE

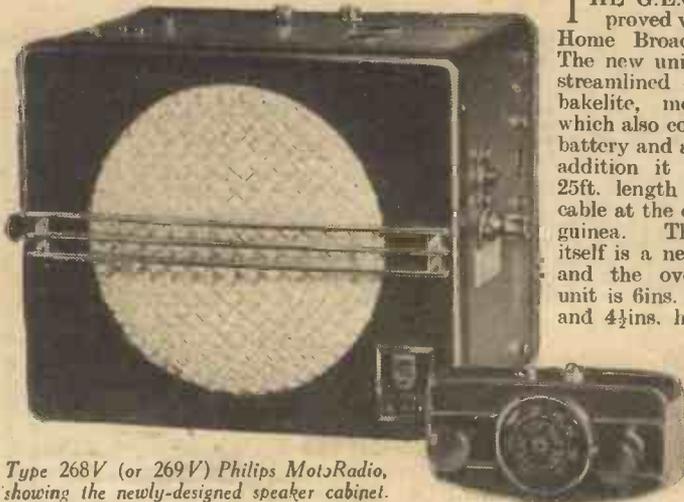
## New Cossor Receivers

TWO new superhets are announced by Messrs. Cossor, one for battery operation and one for mains, both of the superhet type. The battery model is a push-button, four-valve, all-wave receiver of the table type, and re-setting of the buttons may be carried out from the front of the receiver. Bands covered are 16.48 to 50, 190 to 550, and 820 to 2,200 metres. Permeability tuned I.F. transformers are used, with iron-cored pre-selector coils on the medium and long wavebands. The circuit incorporates A.V.C., automatic grid bias, and in addition to tone control a switch plug is provided for extension speaker switching. The price is 9 gns.



Cossor's new battery model 33—all-wave superhet.

The second model is a five-valve all-wave console, possessing many similar circuit details. The wavebands are 16 to 52, 190 to 580, and 840 to 2,150 metres, but standard manual tuning is employed—without the push-button feature. A.V.C., edge-lit tuning dial and an 8in. wide-response energised M.C. speaker are other important features. The valve combination is triode-hexode frequency changer, variable- $\mu$  I.F. amplifier, double-diode-triode detector/amplifier and power triode output stage. The price is 11 gns.



Type 268V (or 269V) Philips MotoRadio, showing the newly-designed speaker cabinet.

## All-Dry Exide Batteries

IN our issue dated June 3rd we gave some details of new Exide batteries for the special portables recently introduced. The first five in that list are Pertrix models, and the last two provide 1.5 and 45 volts, and the catalogue number should carry the prefix H. These two are Drydex models. The correct catalogue reference numbers are therefore: Pertrix 1480, 1481, 1482, 1483, and 1484, and Drydex H.1158 and H.1159.

## Philips Car Radio

A CONSIDERABLE number of detail modifications and improvements, without radical changes in design, are to be noted in the new 268 series of Philips MotoRadio. The complete range and prices of the new models are:—

### Single unit Models:

Type 268V for 6-volt operation—13½ guineas.

Type 269V for 12 volt operation—13½ guineas.

### De Luxe (Separate Speaker) Models:—

Type 258 V for 6-volt operation—15½ guineas.

Type 259V for 12-volt operation—15½ guineas.

The range and prices of the Philips MotoRadio aerials remain as at present—chromium stream-line roof aerial at

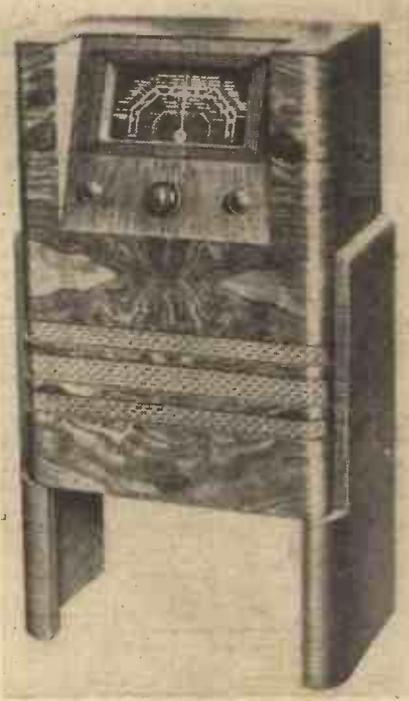
21s.; telescopic side aerial for scuttle or door hinge mounting, 21s.; under car aerial at 10s. 6d. The accompanying illustration shows the de-luxe model and it will be noted that there is now a chromium-plated grille and bars over the speaker opening, and the control head has been modified by placing the medium wave-band settings round the outside of the dial, thus giving more space to them and simplifying tuning.

## New Streamline Home Broadcaster

THE G.E.C. announce an improved version of the popular Home Broadcaster Microphone. The new unit is contained in a streamlined case of glossy black bakelite, mounted on a base which also contains the energising battery and a volume control. In addition it is supplied with a 25ft. length of special screened cable at the original price of one guinea. The microphone cell itself is a new improved pattern and the overall length of the unit is 6ins. and it is 3½ins. wide and 4½ins. high.

## New Mazda Valve Chart

MAZDA have produced a novel valve chart which will be found of the greatest



The new Cossor model 62—an A.C. all-wave console.

value to servicemen. Of the hanging type, this chart has separate pages for each type, and these are numbered and also coloured. It is thus a simple matter to turn up the desired sheet instantly, and all the relative data of that particular class is thus readily seen. One sheet contains all base connections and another all Mazda equivalents in the B.V.A. types. The sheets are attached by press-stud fastenings so that new sheets or revisions may be added from time to time.

## EXHIBITORS AT RADIOLYMPIA

As a result of the ballot for space at Radiolympia the following firms have so far registered for stands and offices:—

### Manufacturers' Stands in Grand Hall and Annexe

Armstrong	G.E.C.	R. & A.
Baird	Garrard	R.G.D.
Balcombe	Goodman's Industries	Rose, Norman
Belling-Lee	Gordon Elf	Rothermel
British Pix	H.M.V.	Scott Insulated
British Rola	Hayberd	Wire
Bulgin	Holsun Batteries	Scophony
Burndept	Invicta	Servisol
Bush	IM/L/P Needles	Siemens
Carr Fastener	McMichael	Steatite & Porcelain
Celestion	Marconi-Ekco	Sterling Batteries
Cossor	Marconiphone	T.C.C.
Decca	Mercantile Credit	Taylor Electrical
Dubilier	Mullard	Instruments
Dynatron	New London	Telegraph Construction
Econasign	Phileo	Ultra
Ediswan	Plesco	Vacuum-Science
Ekco	Plessey	Vidor
E.M.I. Service	Phillips	Westinghouse
Eric Resistor	Pilot Radio	Wingrove & Rogers
Exide	Pye	Wright & Weaire
Ferguson		
Ferranti		

### Wholesalers' Stands at West End of Main Hall

Brown Brothers	Hobday Brothers	Selecta
Dew, A. J.	Lugton	Thompson, Diamond & Butcher
Eastick	National Band	

REMEMBER THE DATE!

RADIOLYMPIA

AUGUST 23rd to SEPT. 2nd

# LATEST PATENT NEWS

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2 either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume or in bound volumes price 2s. each.

## Abstracts Published CATHODE-RAY TUBES.—Bull, C. S. No. 501058.

An electron beam is focused into a small spot by constraining electrons emitted from a rod-like cathode first into a sheet-like form by means of a cylindrical lens and then using a further lens to reduce the sheet-like beam to a spot on a luminescent or mosaic screen. The cathode may be a filament 8, Fig. 1, placed between the rods 9 acting as a control electrode, which receives say a television signal. A flat box-shaped electrode 10 with the rods 9 forms the cylindrical lens and the second lens may be a spherical one formed by the electrodes 11, 12. A slotted diaphragm 13 stops electrons on the edge of the beam. The cathode may be indirectly heated and it may be enclosed in a box-shaped control electrode. The second lens may be cylindrical. The electro-

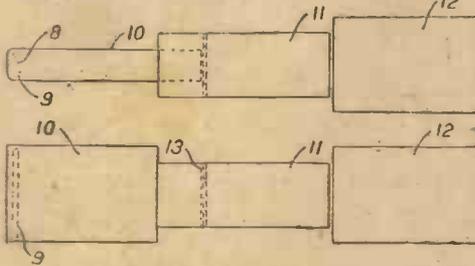


Fig. 1.

static lenses may be made by parallel plates. The cathode may be supplied with current intermittently, i.e., only during "black out" periods of the tube. Magnetic lenses may be used. Specification 434111 is referred to.

## WIRELESS RECEIVING SYSTEMS.—Telefunken Ges. Fur Drahtlose Telegraphie. No. 501051.

An aerial A adapted to receive signals over a wide range of frequencies is coupled to a transmission line L, Fig. 2, by a matching transformer T resonant at the lower

frequency end of the band, the line being terminated, through a high-pass filter S, by a resistance W equal to the surge impedance thereof. The line supplies a plurality of receivers from points a, b. The filter S

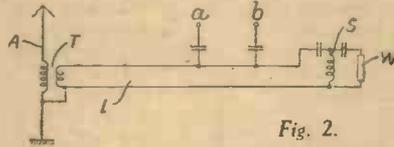


Fig. 2.

may be dimensioned so that the terminating resistance W becomes effective at the frequency at which the capacitive reactance of the cable is equal to the characteristic impedance.

## ACOUSTIC HORNS.—Young, L., and Young, A. No. 500493.

An acoustic horn has an air column conduit incorporating a cavity wall structure which is loaded wholly or in part with cork. As shown the invention is applied to a multi-cellular horn comprising a number of conduits 5, Fig. 3, with curved walls forming the cavities which are filled with cork 8, preferably of granulated or chipped

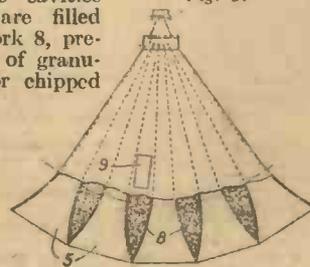


Fig. 3.

form. The cork may be mixed with an agglutinant or spirit and forced under pressure through an opening 9 in the outer wall of the horn and may be maintained under pressure in the cavities. In some cases, the cork may be wholly or in part in the form of strips or plates.

## NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents and are published by permission of the Controller of H.M. Stationery Office and the Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. weekly (annual subscription £2 10s.).

### Latest Patent Applications.

- 14784.—Crowley, D. J.—Radio receiving-apparatus. May 17.
- 14501.—Marconi's Wireless Telegraph Co., Ltd.—Radio antenna. May 15.
- 14242.—Percival, W. S.—Wireless transmitting, etc., systems for two-way operation. May 12.
- 14370.—Philips Lamps, Ltd.—Radio receivers with pre-set tuning. May 13.
- 14371.—Philips Lamps, Ltd.—Circuit-arrangement, etc. May 13.
- 14492.—Philips Lamps, Ltd.—Super-heterodyne radio-receivers. May 15.
- 14649.—Philips Lamps, Ltd.—Television transmitters. May 16.

### Specifications Published.

- 505490.—White, E. L. C., and Faudell, C. L.—Cathode-ray tube television

and like apparatus. (Cognate Application, 2084/38.)

- 505500.—Hadfield, B. M.—Non-linear thermionic valve stages.
- 505448.—Radioakt.-Ges., D. S. Loewe.—Amplifier arrangements for television purposes.
- 505574.—Fernseh Akt.-Ges.—Telekinematographic apparatus.
- 505453.—Weiss, G.—Cathode-ray scanning method for television and like purposes.
- 505303.—Telefunken Ges. Fur Drahtlose Telegraphie.—Radio and like transmitters.
- 505,528.—Cole, Ltd., E. K.—Automatic tuning arrangement in radio receivers of superheterodyne type.
- 505480.—Blumlein, A. D., and White, E.L.C.—Thermionic-valve circuits. (Divided out of 30464/37.)

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.

# RADIO CLUBS & SOCIETIES

Club Reports should not exceed 200 words in length and should be received First Post each Monday morning for publication in the following week's issue.

Special Notice: Will club secretaries please send in reports in the form they appear on this page.

## DOLLIS HILL RADIO COMMUNICATION SOCIETY

Headquarters: Braintcroft School, Warren Road, N.W.2. Hon. Sec.: E. Eldridge, 79, Oxcgate Gardens, Crickelewood, N.W.2. THE President has offered to arrange further outings for 5-metre D.F. work utilising his own transmitting apparatus, and members are asked to communicate with the secretary (preferably at meetings) giving their opinions on the most convenient dates. Every effort will be made in arranging transport for all entrants. G6KQ has been reappointed press representative, and G6OV, our retiring chairman, continues in an advisory capacity. His medical duties have hitherto prevented his regular attendance.

The next meeting is on June 20th, at 8.30 p.m., and we offer a very warm greeting to any visitor. Meetings are at Braintcroft Schools, at the address given above.

## WATFORD AND DISTRICT RADIO AND TELEVISION SOCIETY

Hon. Sec.: P. G. Spencer (G8MH), 11, Nightingale Road, Bushey, Herts.

THE last meeting on May 18th was well attended, and two new members were welcomed, who were introduced by the club notice in PRACTICAL AND AMATEUR WIRELESS. The "junk sale" was a great success.

The next meeting has been arranged for Thursday, June 22nd, at the usual rendezvous, Carlton Tea Rooms, 77a, Queens Road, Watford. It will commence at 8 p.m. Mr. E. L. Gardiner (G6GR) will give a short talk.

## TONYREFAIL AND DISTRICT RADIO SOCIETY

Hon. Sec.: Mr. B. Powell (GW3QB), 44, Pritchard Street, Tonyrefail, Glam.

AT the Annual General Meeting on May 24th, a very successful year was reviewed and ZFRK, GW3QB and GW3CR were re-elected a chairman, secretary and treasurer respectively.

It was decided to hold the society's field-day on July 23rd, and individual members were instructed to construct apparatus for their particular duties. Presentations have been made to GW3GO and GW3QB for the way in which they have contributed to the success of the society.

## WOLVERHAMPTON SHORT-WAVE RADIO SOCIETY

Headquarters: 76, Darlington Street.

Secretary: W. A. Hill.

THERE has been a poor attendance at the four lectures held during the winter, but a large gathering turned up for the 5-metre field day held on May 14th. The party travelled to a high spot near Bridgnorth, and set up a portable station, and immediately contacted a station 20 miles away. After tea another QRA was found, and three contacts, each of 20 miles, were made. Two reports were received from listeners 35 miles away, and one 50 miles away. Two more field days have been arranged for June 18th and July 16th. There are now four stations active on 5 metres in Wolverhampton.

# PRACTICAL MECHANICS HANDBOOK

By F. J. CAMM

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# QUERIES and ENQUIRIES

## Valve Renewal

"My set has been working very well, and I was satisfied until a friend told me that I needed new valves. To prove this he brought round one valve and I put this in the detector stage. There was an immediate increase in signal strength which, he said, proved his point. I am not quite certain of the matter, however, and should be glad to know whether he was right."—W. T. A. (Newbury).

It is quite possible that your friend knew what he was talking about, but at the same time, if you replaced a detector by a high-gain valve you would expect some increase in volume. On the other hand, if your present valves have been in use for a considerable time, it is quite possible that a replacement would be desirable and you can satisfy yourself on this point by taking the valves to a local dealer who has a valve-testing panel, and he will quickly show you the condition of your valves.

## Slow-motion Drives

"Can you recommend a really good slow-motion drive for a short-waver with band-spread tuning? I wish to make really good logs of long-distance stations and find that the dial I have is not sufficiently slow or critical?"—L. K. (Ladywood, Birmingham).

THE better makes of slow-motion dial should be quite suitable, but we note that you have introduced band-spread tuning and we wonder if you have considered the use of the Peto Scott band-spread dial, which has two pointers, is highly geared, and which removes the necessity for a separate band-spread condenser. If you do wish to retain the condenser, there are some good dials in the Eddystone range, and the special Vernier Dial might be suitable for your particular case.

## REPLIES IN BRIEF

The following replies to queries are given in abbreviated form either because of non-compliance with our rules, or because the point raised is not of general interest.

E. B. M. (Camborne). The trouble is not reaction but H.F. instability. The layout is probably responsible, but you should also check components and wiring.

K. J. N. (W.12). We can only refer you to our book on transmission or to various back numbers. Can you give any specific details of the apparatus you require?

T. L. S. (Leicester). When submerged, radio communication is normally impossible, owing to the fact that the aerial is "earthed" through the water. The metal shell of the vessel screens an inbuilt aerial, but we believe that the Americans have experimented with a form of transmitter which has proved successful in trials. No details are available.

T. R. (Birmingham). The valve is quite suitable, but owing to the higher efficiency the circuit may prove slightly unstable, and careful experiment is called for concerning the various voltages. Auto-bias is effected by including a resistance in the H.T.—lead.

P. T. V. (Dartmouth). We have no details-of the apparatus, but should imagine that the reference is to normal grid-bias. The other terms indicate a "straight" and a variable- $\mu$  valve, and indicate the amount of bias required to bring the working point to the correct position.

B. E. S. (Fife). We regret that we cannot supply a blueprint for a set of the type mentioned.

W. G. A. (Liverpool, 14). The glow indicates either that the valve is being over-run (too much H.T. or too little G.B.), or that it is going "soft." We suggest that you have the valve tested.

L. C. (Ladywood). We cannot give the address, but if you will send a letter to him, care of this office, we will have it forwarded.

H. C. S. B. (Hythe). You must place your aerial well clear of the relay wires and must use a really good aerial and earth.

S. W. G. (Clacton-on-Sea). We are unable to supply a blueprint of a set of the type mentioned.

The coupon on page iii of cover must be attached to every query.

IT is most likely that the H.F. valve is oscillating and you can make a rough check of this by touching the grid terminal. If a distinct and loud "plop" is heard in the 'phones or speaker you will know that the valve is oscillating. A more reliable check is to include a milliammeter in the anode circuit. When the grid is earthed the anode current will rise if the valve is in an oscillating condition. The remedy is to modify the screen voltage, provided, of course, that there is no interaction between anode and grid leads or components which could cause feed-back sufficient to produce oscillation.

## Extension Speaker Switching

"I have fitted an extension speaker to my commercial set, but although I have mounted the sockets in a suitable position

### RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporaries.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.
- (5) Grant interviews to querists.

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.

Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

I have to switch off and make two or three alterations before the extra speaker can be used. Is there any simple way of switching the speaker so that the anode circuit is not broken, as I understand that this should be avoided?"—P. S. (Copnor).

THE small Clix L.S. Control Panel should be ideal for your purpose. This is provided with a two-pin plug to which the extension speaker is joined. When inserted into the small bakelite panel the extra speaker is included with the existing speaker, and by rotating the plug—for which purpose the panel is slotted—the built-in speaker is cut out and the extension speaker left in circuit. The device costs 1s.

## EVERYMAN'S WIRELESS BOOK

By F. J. CAMM

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## Detector Circuit

"I am trying to design a short-waver which will be of the straight type but which will be reliable. I have tried several standard detector stages but although I can get smooth reaction and various other desirable features, sensitivity is not all that could be desired. Can you offer any suggestions for 'out of the ordinary' circuits which I might try?"—L. E. R. (Harrow).

WHILST out-of-the-ordinary circuits may be found useful, it is preferable to use tried and tested circuits for short-wave work. If you need something a little different, why not try a pentode detector with electron-coupled reaction? This could be arranged on standard plug-in coils, and for reaction control a screen potentiometer would be found ideal. Some experiment would have to be carried out to find the best tapping point on the coil, but the arrangement is smooth, gain is high, and if a flatly-tuned H.F. stage precedes it you will find that no dead spots will be experienced and you should get all that you desire on such an arrangement.

## Carbon Granules

"I should like the address of a firm supplying fine grade carbon granules suitable for the transverse current mike described by you recently."—D. M. (Malta).

A SMALL phial of granules, sufficient for the mike in question, may be obtained from Messrs. T. W. Thompson, of Greenwich High Road, Greenwich. The price is 2s.

## Choke Coupling

"I have been trying choke coupling in a small gramophone amplifier which I have built but there is no L.F. amplification. I enclose a circuit and should like to know whether the trouble is due to the choke being unsuitable. If so, can you recommend a component which will work in this circuit? I want to use this arrangement as I have been told that better quality is obtainable and I am anxious to see if this is so in my case."—L. S. W. (Barnsley).

THE choke shown by you is an H.F. component and is therefore unsuitable for L.F. coupling. You need an iron-core or L.F. choke. Special components are available for the purpose, or you can use the primary winding of an ordinary L.F. transformer. It is also possible to connect primary and secondary in series if a higher inductance is required, but in this case care must be taken to connect the windings in phase, or the inductance will be decreased.

## Oscillation

"I have a small four-valver which is giving trouble, due, I believe, to the H.F. stage being wrongly designed. I have a straight pentode with fixed screen voltage, but I get a squeal when the H.F. and detector stages are in tune. The squeal varies in note just like reaction oscillation, and I should like to know whether this indicates merely interaction or H.F. instability. If so, what is the cure?"—C. R. (Southport).

# Practical and Amateur Wireless BLUEPRINT SERVICE

These Blueprints are drawn full size. Copies of appropriate issues containing descriptions of these sets can in some cases be supplied at the following prices, which are additional to the cost of the Blueprint. A dash before the Blueprint Number indicates that the issue is out of print.

Issues of Practical Wireless .. 4d. Post Paid.  
 Amateur Wireless .. 4d. ..  
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 Wireless Magazine .. 1/3 ..

The index letters which precede the Blueprint Number indicate the periodical in which the description appears: Thus P.W. refers to PRACTICAL WIRELESS, A.W. to Amateur Wireless, P.M. to Practical Mechanics, W.M. to Wireless Magazine.

Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable) to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

PRACTICAL WIRELESS		No. of	SUPERHETS.	
CRYSTAL SETS.		Date of Issue.	Blueprint.	
Blueprints, 6d. each.			Battery Sets: Blueprints, 1s. each.	
1937 Crystal Receiver		PW71	£5 Superhet (Three-valve)	5.6.37 PW40
The "Junior" Crystal Set	27.8.38	PW94	F. J. Camm's 2-valve Superhet	13.7.35 PW52
<b>STRAIGHT SETS. Battery Operated.</b>			F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37 PW75
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All-Wave Unipen (Pentode)		PW31A	A.C. £5 Superhet (Three-valve)	PW43
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The "Pyramid" One-valver (HF Pen)	27.8.39	PW93	Universal £5 Superhet (Three-valve)	PW44
Two-valve: Blueprints, 1s. each.			F. J. Camm's A.C. £4 Superhet	31.7.37 PW59
Four-range SuperMag Two (D, Pen)		PW36B	F. J. Camm's Universal £4 Superhet 4	
The Signet Two (D & LF)	24.9.38	PW70	"Qualitone" Universal Four	10.1.37 PW73
Three-valve: Blueprints, 1s. each.			Four-valve: Double-sided Blueprint, 1s. 6d.	
The Long-range Express Three (SG, D, Pen)	24.4.37	PW2	Push-Button 4, Battery Model	22.10.38 PW95
Selectone Battery Three (D, 2 LF Trans)		PW10	Push-Button 4, A.C. Mains Model	
Sixty Shilling Three (D, 2 LF RC & Trans)		PW34A	<b>SHORT-WAVE SETS.</b>	
Leader Three (SG, D, Pow)	22.5.37	PW35	One-valve: Blueprint, 1s.	
Summit Three (HF Pen, D, Pen)		PW37	Simple S.W. One-valver	9.4.38 PW38
All Pentode Three (HF Pen, D Pen, Pen)	20.5.37	PW39	Two-valve: Blueprints, 1s. each.	
Hall-mark Three (SG, D, Pow)	12.6.37	PW41	Midget Short-wave Two (D, Pen)	
Hall-mark Cadet (D, LF, Pen, RC)	16.3.35	PW48	The "Fleet" Short-wave Two (D HF Pen, Pen)	27.8.39 PW91
F. J. Camm's Silver Souvenir (HF Pen, D Pen, Pen) (All-Wave Three)	13.4.35	PW49	Three-valve: Blueprints, 1s. each.	
Genet Midget (D, 2 LF Trans)	June '35	PM1	Experimenter's Short-wave Three (SG, D, Pow)	30.7.38 PW30A
Gameo Midget Three (D, 2 LF Trans)	8.6.35	PW51	The Perfect 3 (D, 2 LF RC and Trans)	7.8.37 PW63
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)		PW53	The Band-Spread S.W. Three (HF Pen, D Pen, Pen)	1.10.33 PW68
Battery All-Wave Three (D, 2 LF RC)		PW55	<b>PORTABLES.</b>	
The Monitor (HF Pen, D, Pen)		PW61	Three-valve: Blueprints, 1s. each.	
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62	F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	PW65
The Centaur Three (SG, D, P)	14.8.37	PW64	Parvo Flyweight Midget Portable (SG, D, Pen)	3.6.39 PW77
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.30	PW69	Four-valve: Blueprint, 1s.	
The "Colt" All-Wave Three (D 2 LF RC & Trans)	18.2.39	PW72	"Imp" Portable 4 (D, LF, LF, Pen)	10.3.33 PW89
The "Rapide" Straight 3 (D, 2 LF RC & Trans)	4.12.37	PW52	<b>MISCELLANEOUS</b>	
F. J. Camm's Oracle All-Wave Three (HF, Det., Pen)	28.3.37	PW78	S.W. Converter-Adapter (1 valve)	PW48A
1938 "Tribaud" All-Wave Three (HF Pen, D, Pen)	22.1.33	PW84	<b>AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.</b>	
F. J. Camm's "Sprite" Three (HF Pen, D, Tet)	26.3.33	PW87	Blueprints, 6d. each.	
The "Hurricane" All-Wave Three (SG, D Pen, Pen)	30.4.39	PW89	Four-Station Crystal Set	23.7.38 AW427
F. J. Camm's "Push-Button" Three (HF Pen, D, Pen, Tet)	3.9.39	PW92	1934 Crystal Set	AW444
Four-valve: Blueprints, 1s. each.			150-mile Crystal Set	AW450
Sonotone Four (SG, D, LF, P)	1.5.37	PW4	<b>STRAIGHT SETS. Battery Operated.</b>	
Fury Four (2 SG, D, Pen)	8.5.37	PW11	One-valve: Blueprints, 1s. each.	
Beta Universal Four (SG, D, LF, Cl. B)		PW17	B.B.C. Special One-valver	AW337
Nucleon Class B Four (SG, D (SQ), LF, Cl. B)	6.1.34	PW34B	Two-valve: Blueprints, 1s. each.	
Fury Four Super (SG, SG, D, Pen)		PW34C	Melody Ranger Two (D, Trans)	AW339
Battery Half-Mark 4 (HF Pen, D, Push-Pull)		PW40	Full-volume Two (SG det, Pen)	AW392
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.0.33	PW67	Lucerne Minor (D, Pen)	AW426
All-Wave "Corona" 4 (HF Pen, D, LF, Pow)	9.10.37	PW79	A Modern Two-valver	WM409
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The "Admiral" Four (HF Pen, HF Pen, D, Pen RC)	3.9.33	PW90	Class B Three (D, Trans, Class B Fan and Family Three (D, Trans, Class B)	25.11.33 AW410
<b>Mains Operated.</b>			£5 5s. S.G.3 (SG, D, Trans)	2.12.33 AW 412
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A.C.-D.C. Two (SG, Pow)		PW31	Lucerne Straight Three (D, RC, Trans)	AW437
Selectone A.C. Radiogram Two (D, Pow)		PW19	Transportable Three (SG, D, Pen)	WM271
Three-valve: Blueprints, 1s. each.			Simple-Tune Three (SG, D, Pen)	June '33 WM327
Double-Diode-Triode Three (HF Pen, DDT, Pen)		PW23	Economy-Pentode Three (SG, D, Pen)	Oct. '33 WM337
D.C. Ace (SG, D, Pen)		PW25	"W.M." 1934 Standard Three (SG, D, Pen)	WM351
A.C. Three (SG, D, Pen)		PW29	£8 3s. Three (SG, D, Trans)	Mar. '34 WM354
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D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B	PTP Three (Pen, D, Pen)	WM389
Ultique (HF Pen, D, Pen, Pen)	28.7.31	PW36A	Certainty Three (SG, D, Pen)	WM393
Armada Mains Three (HF Pen, D, Pen)		PW38	Minute Three (SG, D, Trans)	Oct. '35 WM396
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50	All-Wave Winning Three (SG, D, Pen)	WM400
"All-Wave" A.C. Three (D, 2 LF RC)		PW34	Four-valve: Blueprints, 1s. 6d. each.	
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Mains Record All-Wave 3 (HF Pen, D, Pen)	6.12.36	PW70	2HF Four (2 SG, D, Pen)	AW421
All-World Ace (HF Pen, D, Pen)	28.8.37	PW80	Self-contained Four (SG, D, LF, Class B)	Aug. '33 WM331
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A.C. Fury Four (SG, SG, D, Pen)		PW20	£5 5s. Battery Four (HF, D, 2 LF)	Feb. '35 WM381
A.C. Fury Four Super (SG, SG, D, Pen)		PW34D	The H.K. Four (SG, SG, D, Pen)	Mar. '35 WM384
A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37	PW45	The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	Apr. '36 WM404
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Harris' Jubilee Radiogram (HF Pen, D, LF, P)	May '35		WM386
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S.W. One-valver for America	15.10.38		AW129
Rome Short-waver			AW152
Two-valve: Blueprints, 1s. each.			
Ultra-short Battery Two (SG det, Pen)	Feb. '36		WM192
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Three-valve: Blueprints, 1s. each.			
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Experimenter's 5-metre Set (D, Traus, Super-regen)	30.6.34		AW433
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Standard Four-valver Short-waver (SG, D, LF, P)	Mar. '35		WM333
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Simplified Short-wave Super	Nov. '35		WM397
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Two-valve Mains Short-waver (D, Pen) A.C.			AW453
"W.M." Long-wave Converter			WM386
Three-valve: Blueprint, 1s.			
Emigrator (SG, D, Pen) A.C.			WM357
Four-valve: Blueprint, 1s. 6d.			
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	Aug. '35		WM353
<b>MISCELLANEOUS.</b>			
S.W. One-valve Converter (Price 6d.)			AW320
Enthusiast's Power Amplifier (1/6)			WM387
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De Luxo Concert A.C. Electrogram (1/-)	Mar. '36		WM493
New Style Short-wave Adapter (1/-)			WM383
Trickle Charger (6d.)	Jan. 5, '36		AW462
Short-wave Adapter (1/-)			AW456
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B.I.D.L.C. Short-wave Converter (1/-)	May '36		WM105
Wilson Tone Master (1/-)	June '36		WM408
The W.M. A.C. Short-wave Converter (1/-)			WM403

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**6<sup>th</sup> JUNE**

# Practical and Amateur Wireless

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Edited by F.J. CAMM

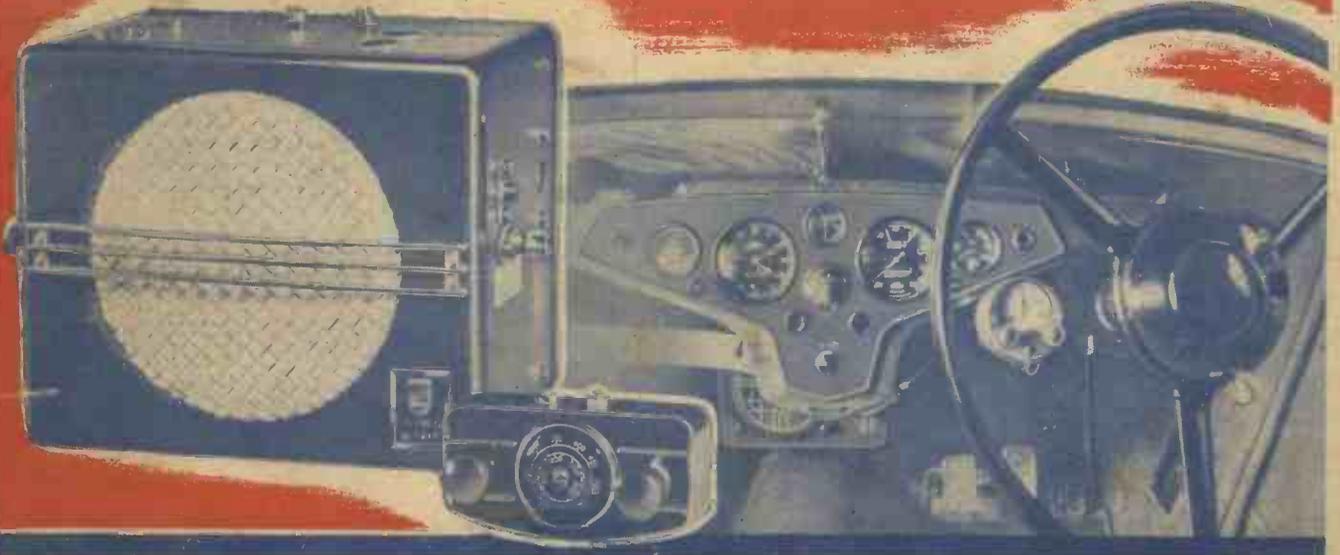
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June 24th, 1939.

**AND PRACTICAL TELEVISION**

## CAR RADIO

### *Receiver Problems*



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# A 10- AND 20-METRE RECEIVER See Page 345



# Practical and Amateur Wireless

Edited by F. J. CAMM

*Technical Staff:*  
W. J. Delaney, H. J. Barton Chapple, Wh.Sch.,  
B.Sc., A.M.I.E.E., Frank Preston.

Vol. XIV. No. 353. June 24th, 1939.

## ROUND *the* WORLD of WIRELESS

### Car Radio

THE summer months bring to the fore the problem of car radio, although many motorists now make regular use of this part of modern car equipment. For temporary summer use a standard portable may, of course, be used in the car, but where apparatus is to be permanently installed there are many problems to be overcome. Apart from the size of the apparatus, which must be considered where there is not much room to house a permanent receiver, there is the question of screening and the removal of interference from the various electrical items in the car. The question of the aerial, too, is not easily answered as there are so many alternative types now seen on the roads. The circuit is another problem, and in some cases a very powerful superhet may be thought desirable, whilst for picnics or other pleasure trips a simple two or three-valver may give all that is desired, especially if a temporary aerial is slung on nearby trees. Some of these problems and others in connection with car radio are dealt with this week, and full details will be found on page 348.

### Police Radio

SMALL transceivers are to be provided at every chief police station in the London Metropolitan area. These are to be used for urgent police work, although the main idea underlying the installation is in connection with A.R.P. work. At Stockholm, in Sweden, a new ultra-short-wave transmitter has been installed, working on 9.4 metres, for use in connection with radio-equipped patrol cars and local stations.

### Café Colette

WALFORD HYDEN and his Orchestra make a welcome return to B.B.C. programmes in a new "Café Colette" series which will begin on July 3rd. This will be a programme of dance music from the Continent and other parts of the world, in addition to the orchestra, listeners will hear Lola Shari, Marcel de Haes and Dimitri Vetter. Production is by John Sharman.

Walford Hyden promises something new in these programmes, and is making an extensive tour of Europe, collecting material. He recently spent a week in the Basque village of Sare, where he discovered some very lovely folk-tunes, many of which, he feels sure, will never have been heard before by listeners. These were sung to him by the

villagers, who also played them on instruments made in wood of the tin-whistle pattern—usually in quartets made up of drums and three of these instruments.

### "All Down for the Finale"

REGINALD BURSTON was the originator of the idea of a programme which would recall some famous musical

before it is accepted for general use; with the remarkable inventions which have helped to improve aircraft performance and safety; with aerobatics and their uses in discovering the handling qualities of different machines in the air, and with some of the strange aeroplanes that have been produced with special objects in view.

Major Stewart's first talk, to be broadcast on July 28th, will be entitled "When an Aeroplane is Tested," and he will be speaking subsequently on "Some Aerial Inventions," "Aerobatics" and "Queer Aircraft."

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comedies with the call-boy's "All Down for the Finale," and his reminiscences of plot and counter-plot as the "peg" for musical illustrations. The second programme of this type will be broadcast on June 26th. It will be presented by Gordon Crier. Reginald Burston will conduct the Midland Revue Orchestra and Midland Revue Chorus, and four soloists will take part in the programme.

### Flying Time—1

MAJOR OLIVER STEWART, a pilot of long experience, will give a series of four talks on the practical work that goes to the making and perfecting of an aeroplane. The speaker, who was engaged for some time on experimental and test flying for the Government, and who is a writer on aeronautical subjects, will deal with the tests through which a new aeroplane goes

### The Test Match

THE first Test Match between England and the West Indies opens on June 24th. The B.B.C. is arranging to cover the match fully by giving commentaries during several periods of the day. This match will be staged at Lord's—a ground where the West Indies have put up many excellent performances in the past. The B.B.C.'s commentators will be Howard Marshall and Michael Standing. Broadcasting periods are timed for just before the intervals, so that not only will listeners hear a running commentary, but also a summary of the previous play and a general appreciation of the progress of the match.

### British History

CAROLA OMAN, well-known novelist daughter of a famous historian, is to broadcast on the development in nursing services during the last hundred years. She will speak on June 22nd, of Sairey Gamp, Charles Dickens's famous character from "Martin Chuzzlewit," who, with her husky voice and moist eye and aroma of spirits, was a typical nurse of the period. Then came the Crimean War and Florence Nightingale, and this indomitable heroine saw to it that her country had nurses who were a credit and not a disgrace.

### Northern Command Tattoo

ONCE again the North Region is arranging broadcasts from the Northern Command Searchlight Tattoo at Roundhay Park, Leeds. Early in the evening, on June 29th, listeners will hear a sound picture of the preparations and rehearsals of the Tattoo, recorded at the arena in the Park. Victor Smythe has arranged this programme, and Richard North will act as commentator.

# ROUND the WORLD of WIRELESS (Continued)

## European Statistics

AT the end of 1938 the total amount of energy radiated by the 310 long- and medium-wave broadcasting stations in Europe totalled 8,230 kilowatts. It is to be assumed that with the increase in transmitters, of which the number will attain 350 by the end of 1939, and the extra power to which some of the existing ones are being boosted, the total energy should reach 11,000 kilowatts. Denmark still heads the list for the highest number of radio listeners in proportion to population, with 206 per 1,000 inhabitants; Sweden is next with 194, followed by Great Britain with 193. Greece and Turkey are the least radio-minded States, as they only possess three licences per 1,000 head of population! The aggregate number of radio receivers in Europe is now estimated at 35,130,000. Although a great increase is shown in the numbers of listeners acquired by each State, it should be borne in mind that some figures may prove misleading as, for instance, Germany has granted free licences to 78,653 homes, whereas such an advantage in Great Britain has only been conceded to 51,872 disabled persons.

## Some Interesting Harmonics

MANY listeners are puzzled by broadcasts tuned in on unusual sections of the short wave-band, and for this reason find some difficulty in identifying the transmission. In many instances these signals are harmonics of broadcasts made by medium-wave transmitters. On channels above 50 metres the following are particularly frequent: 4th harmonic of Poste Parisien on 78.2 m. (3.836 mc/s) and the 5th on 62.56 m. (4.595 mc/s). The 5th harmonic of Rennes P.T.T. is well heard on 57.7 m. (5.2 mc/s), and Radio Normandy can be logged on its 7th harmonic, 39.14 m. (7.665 mc/s), and the 6th on 34.25 m. (8.76 mc/s).

## Southport Entertainments

ON Wednesday night, June 28th, Victor Smythe is to present an O.B. tour by microphone of some of Southport's entertainments. This will include visits to the Scala Follies at the Scala Theatre; to the Floral Hall to hear Arthur Jacobsen and his band; and to the Garrick Theatre to hear an excerpt from the variety bill.

## Northern Cabaret

MURIEL LEVY and Joyce Lustgarten have devised and will produce in the Northern programme on June 27th a Cabaret Entertainment, with Jessie Driver, Taylor Frame, Doris Gambell, Muriel Levy and Wilfred Pickles, as the artists. David Webster will be the compère and Maurice Arnold and Doris Kenna will be at the pianos.

## INTERESTING and TOPICAL NEWS and NOTES

### "A La Carte"

IN a Mixed Menu of Light Fare, "A la Carte," to be presented by Leslie Bridmont on June 22nd, in the Western programme, the artists will be: White and Woodman, "In Original Songs at the Piano"; Dorothy Holloway, in a "Lady Leamington" sketch; the Three Nomads, "In Close Harmony"; and Robert Keys, "Syncopating Pianist."



Many famous actors and actresses attended the Theatrical Garden Party at Ranelagh recently. Our illustration shows "Gert and Daisy," the popular radio stars, selling their wares.

## Australian Short-wave Transmission Schedule (July, 1939)

VK2ME (Sydney) 31.28 m.: Sundays (Sydney Time), 3 p.m. to 5 p.m. (05.00-07.00 G.M.T.), 7.30 p.m. to 11.30 p.m. (09.30-13.30 G.M.T.); Mondays, 2.30 a.m. to 4.30 a.m. (16.30-18.30 G.M.T.).

VK3ME (Melbourne) 31.5 m.: Nightly (Melbourne Time), Monday to Saturday (inclusive), 7 p.m. to 10 p.m. (09.00-12.00 G.M.T.).

VK6ME (Perth) 31.28 m.: Nightly (Perth Time), Monday to Saturday (inclusive), 7 p.m. to 9 p.m. (11.00-13.00 G.M.T.).

## Theatre Orchestra from Aberdeen

THE orchestra of the Tivoli Theatre, Aberdeen, under its conductor, Clifford Jordan, will broadcast a short programme of music before the evening's show begins on June 30th. Listeners have often heard the orchestra accompanying the variety artists who have broadcast from this theatre, but on June 30th they will be given an opportunity to hear the band giving an entertainment in its own right.

The programme will include the London-derry Air, the "Ständchen" serenade, Alford's march "The Quarterdeck," selections from "Chu Chin Chow," and Scottish songs.

## Isobel Baillie's Recital

ISOBEL BAILLIE will be the soloist in the next of the North Region's special series of recitals by distinguished Northern singers, accompanied by the B.B.C. Northern Orchestra. She will be heard on Tuesday, June 27th.

## Studio Variety

TARRANT BAILEY, jr., the banjost, and "Aerbut and Gaertie," in a Birmingham dialect sketch, are the two turns for a studio variety programme on June 22nd. "Aerbut and Gaertie" sketches are the work of Graham Squiers, who has broadcast and written for radio since 1923. He and Edith James take the parts of "Aerbut" and "Gaertie" respectively.

## Cabaret from Bournemouth

ARTISTS in Tea-Time Cabaret from the Continental Restaurant, Bournemouth, on June 23rd, will include Renée Barr (soprano), Eric Shrimpton (electric and Spanish guitars), Peter Valerio ("The Wonder Boy Accordionist"), and Leonardi and his Wiener Orchestra.

## Saturday Concert Hall

LUCY PIERCE (pianoforte) will be the soloist with the B.B.C. Northern Orchestra in "Saturday Concert Hall," on July 1st. H. Foster Clark will be the conductor, except in the last item of the programme, "Variations on an Original Theme," by Gordon Jacob, which the composer himself will conduct.

## SOLVE THIS

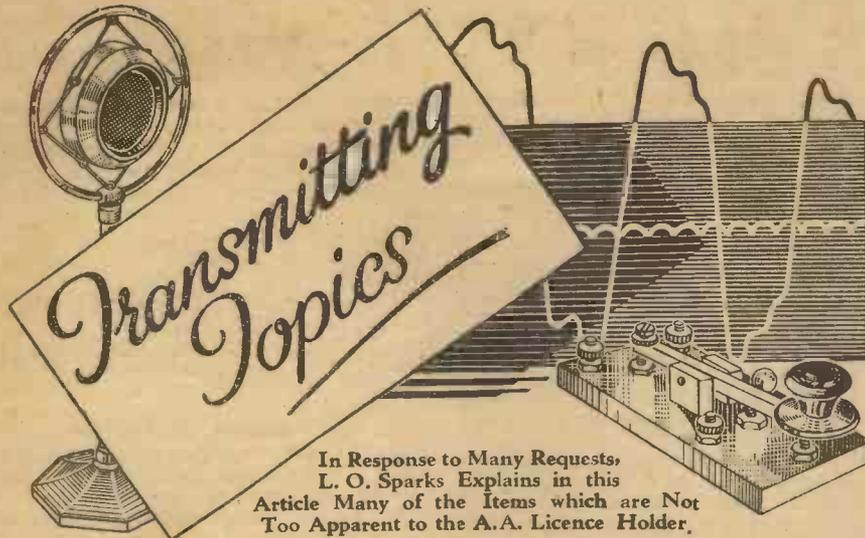
### PROBLEM No. 353

Jackson was not satisfied with the selectivity on his two-valve battery receiver and decided that a wave-trap would be of value to him. He looked through his spares box and found a suitable former with several old spools of wire. He had no idea of the gauges of types of wire but selected what he thought would be suitable material and from a coil-winding data sheet wound a coil of the correct number of turns on the selected former. He connected a standard .0005 mfd. condenser in parallel and joined the two in series with his aerial. The wave-trap failed to function. The connections were all perfectly in order. What was wrong? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 353 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, June 26th, 1939.

### Solution to Problem No. 352

When Boswell purchased his new volume control he failed to obtain one with an insulated spindle. As the control was mounted on a metal panel which was earthed, he earthed the screen of his valve and thus cut out the reaction effect. His previous control had an insulated spindle.

The following three readers successfully solved Problem No. 351, and books have accordingly been forwarded to them: J. McLehan, 196, North Street, Charing Cross, Glasgow; G. A. D. Brittain, 77, Station Road, Hendon, N.W.4; W. Harrington, 1, Goldsmith Crescent, Endlebury Road, N. Chingford.



In Response to Many Requests,  
L. O. Sparks Explains in this  
Article Many of the Items which are Not  
Too Apparent to the A.A. Licence Holder.

It is becoming increasingly evident that the articles on Transmitting which have appeared in these pages in past issues have been the means of starting many enthusiasts along the right road to amateur transmitting. It is also

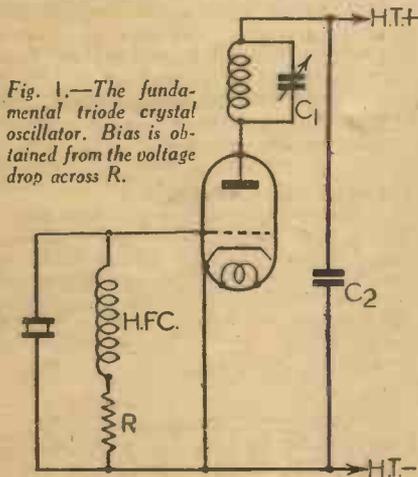
for him to delay his application until he has obtained more knowledge about the subject, by reading, co-operating with a licence holder, taking an active part in his local radio club, or by attending a series of suitable lectures. Please, therefore, don't ask the Q. Service to fill in the missing words.

**Selection of Apparatus**

Whether it is through seeing photographs of rather fine and, in some cases, elaborate installations of amateur transmitting stations, or whether it is through the desire to make the apparatus look very important and awe inspiring (to the uninitiated) I cannot say, but it is quite obvious that many seem to think that a whole heap of special components and coils are essential for the satisfactory operation of even a very modest rig. Fortunately, the idea is quite harmless, though often rather expensive to the person concerned, but looking at it from another angle, such impressions if elaborated on often have the effect of throwing a wet blanket on a would-be enthusiast's ambitions on account of possible expenditure alleged to be necessary.

For the average A.A. station, and even many 10 watters, special equipment is not necessary. Ordinary good makes of fixed and variable condensers can be used; ordinary grades of short-wave coil formers

Fig. 1.—The fundamental triode crystal oscillator.



becoming apparent, by the numerous letters received by the Query Service Department, that there are quite a number of items which raise certain doubts in the minds of those who have reached the A.A. stage, and who wish to make the most of the facilities thus granted. It would be impossible to deal, in detail, with all the little snags which crop up in the experimenter's path in a single article, therefore those which seem most common have been selected for attention in this issue.

In the first place, there is one query which can be termed general and in view of this and its nature it calls for a few words if only to save others postage and waste of time. It relates to the would-be applicant for an A.A. licence. On receiving the application form from the Engineer-in-Chief (Radio Section) of the G.P.O., many are at a loss how to complete certain sections of the form and, quite naturally I suppose, they write to the Query Service Department for advice or, in other words, instructions on how to fill in the required details. Well, while it is the Editor's great desire to render every possible assistance through the Queries Dept., it must be appreciated that there are certain things which, in fairness to all parties, they cannot undertake.

Unless the applicant can answer all the questions himself, it would be advisable

are quite satisfactory, and well seasoned wood can be used for the baseboard and panel if so desired. It can be summed up in a nutshell by saying that most S.W. gear, provided it is good grade stuff, can be used quite safely for the average low-power installation.

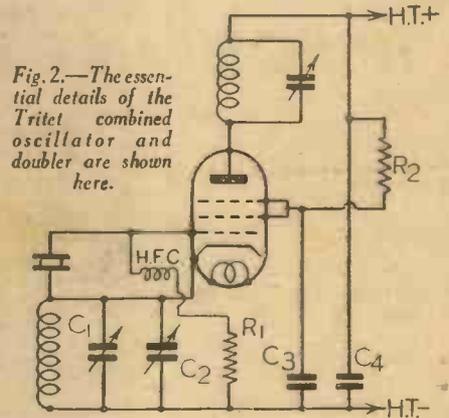
If funds permit buying some of the components designed for amateur transmitting work, and there are several British firms of high repute who specialise in such products, well, so much the better, as they will then be to hand when the day comes for the building of a more powerful high-voltage outfit, but don't let the bogey of costly apparatus stop you from taking up your hobby.

**Circuits**

The essential part of a transmitter is a generator of oscillations. This function is performed by a valve similar in all respects to those employed in certain sections of a radio receiver or L.F. amplifier. They can be divided into two types, namely triode and pentode. The question which so often arises is "Which type shall I use?"

Both types of valves make good oscillators, therefore the ultimate choice might be governed by which is to hand. If, however, a valve has to be purchased, then it should be noted that there is one im-

Fig. 2.—The essential details of the Triton combined oscillator and doubler are shown here.



portant advantage offered by the pentode. When oscillations of the type associated with a transmitter, i.e., H.F. oscillations, are generated in a valve circuit which has its frequency controlled by a quartz crystal, a certain amount of heat is produced, and the crystal is subjected to stresses and strains which, if allowed to exceed certain limitations, will cause frequency drift and damage to the crystal. If a triode is compared with a pentode, it will be found that it is possible to obtain a greater output with a pentode than with a triode. This means that with crystal conditions being equal, the pentode is really the better of the two valves, and this fact is amply proved by its popularity amongst amateurs. As one is concerned with valves having generous anode emission, when considering oscillators, the triodes or pentodes must, of course, be of the L.F. power types.

One other feature which adds to the attractiveness of the pentode is, those types which have the suppressor grid brought out to a separate valve-pin, as with most valves of the multi-pin type, enable a very easy and efficient form of modulation to be obtained, this being known as "suppressor-grid" modulation.

Another problem which so often faces the transmitter constructor is "How many valve stages shall I require?"

This is a question which cannot be  
(Continued on next page.)

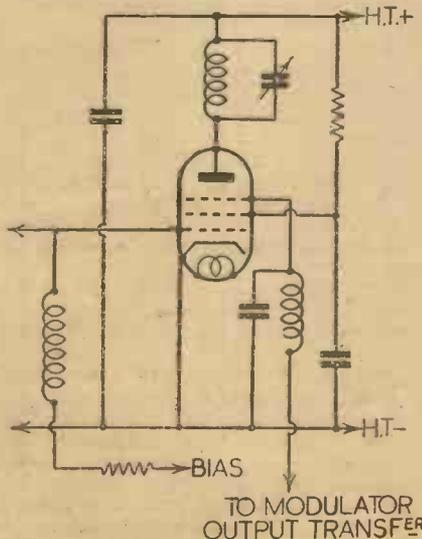


Fig. 3.—A P.A. stage using a pentode with suppressor grid modulation.

## TRANSMITTING TOPICS

(Continued from previous page)

answered by simply saying one, two, three or four, as so much depends on the objects the constructor has in mind, and the work which the circuit will be expected to do.

The simplest C.W. transmitter need only have one valve; it is also possible to build an oscillator and telephony modulator by using some of the modern multi-electrode valves which, to quote one example, can consist of two triodes or pentodes in one bulb.

Another very popular and efficient arrangement is that which uses a pentode in a Tritet circuit. This enables the valve to act as a crystal-controlled oscillator and/or as a C.O. and frequency-doubler. It will be realised that this combination allows two or more wavebands, harmonically related, to be covered efficiently. ]

Other stage arrangements can be, to quote but the fundamental circuits, the above Tritet feeding into one or two valves as a power amplifier; a single valve as C.O. plus another as P.A.; this, of course, would only operate on the fundamental frequency of the crystal. The same combination plus an additional valve as modulator, or a more ambitious circuit could consist of a C.O. plus a buffer or doubler

stage plus a P.A. stage plus a two-valve modulator section.

The ultimate selection really depends on requirements and funds, but the latitude of circuit arrangements is so wide that there is no reason why the keen A.A. enthusiast should not try all possible combinations, and make most careful observations of the behaviour and operating conditions of the individual tests.

## Modulators

This is another section of a transmitter which appears to cause quite a number of wrinkled brows. Actually, there is really no need to become troubled through trying to calculate this and that concerning what type of amplification to use, or how many watts of L.F. output will be required to modulate fully a given carrier wave.

It is not possible in this article to go into technical details, so a few brief facts must suffice, at least in this issue. The modulator stage is essentially for the purpose of amplifying the weak signals obtained from the microphone to a strength sufficient to modulate the C.W. carrier wave when injected into the transmitter at a suitable stage. It is a plain L.F. amplifier. The only care necessary is that which will ensure distortionless amplification of the microphone's output.

The circuit can consist of any of the usual L.F. output arrangements, power, pentode, Class A push-pull or Class B, the latter becoming very popular owing to the output obtainable with modest voltage and current requirements.

The connection of the output of the modulator to the transmitter depends on the form of modulation employed. This does not mean the form of amplifier but the method of adding the L.F. signal to the carrier. These methods will be discussed later.

Now as regards the L.F. power required to modulate a given carrier, say 100 per cent. When a carrier wave is modulated to this extent, its amplitude is doubled, therefore the peak power at any given instant will be four times the unmodulated power of the carrier. In case this is not clear, it must be remembered that the power is proportional to the square of the current. If, therefore, a pure sine-wave signal is used for modulation purposes, the average power of the modulated carrier will be 50 per cent. greater than when it is unmodulated or, in other words, if it is required to modulate say, a 5-watt carrier, we shall have to use a modulator capable of giving an output of at least 2½ watts, and so on. But more about this anon.

## IMPORTANT BROADCASTS OF THE WEEK

### NATIONAL (261.1 m. and 1,500 m.)

Wednesday, June 21st.—Glyndebourne Opera: Don Giovanni, Act I.

Thursday, June 22nd.—Short Mid-week Service from St. Michael's, Chester Square.

Friday, June 23rd.—Music from the Movies.

Saturday, June 24th.—The Church by the Sea, a play.

### REGIONAL (342.1 m.)

Wednesday, June 21st.—Roundabout—an all-Regional variety programme.

Thursday, June 22nd.—Sacred Service, by Ernest Bloch, from St. Anne's Cathedral, Belfast.

Friday, June 23rd.—Theatre Royal, Bristol, feature by Wilfrid Rooke Ley.

Saturday, June 24th.—The House and the Man—D. H. Lawrence at Tregethen.

### MIDLAND (296.2 m.)

Wednesday, June 21st.—Running Your Own Show—Village Players.

Thursday, June 22nd.—British National Songs and their Stories.

Friday, June 23rd.—Discussion—Home-work.

Saturday, June 24th.—General Release: Songs from the Current Films.

### WELSH (371.1 m.)

Wednesday, June 21st.—Sunday School Trip: Part 2.

Thursday, June 22nd.—Welsh Flannin, The Saga of a Mid-Wales Industrial Town.

Friday, June 23rd.—Music, Maestro, Please: A Parade of Song Hits.

Saturday, June 24th.—Prehistory in the Countryside: The Roads of Wales.

### WEST OF ENGLAND (285.7 m.)

Wednesday, June 21st.—Concert—from the Public Schools.

Thursday, June 22nd.—A La Carte—variety programme.

Friday, June 23rd.—Theatre Royal, Bristol—feature by Wilfrid Rooke Ley.

Saturday, June 24th.—Rodelinda, Act I, from Dartington Hall.

### NORTHERN (449.1 m.)

Wednesday, June 21st.—The Blackpool Dog Show, from Blackpool.

Thursday, June 22nd.—All the Fun of the Fair, from Town Moor, Newcastle-upon-Tyne.

Friday, June 23rd.—The Marine Follies—variety from Fleetwood.

Saturday, June 24th.—Orchestral Concert.

### SCOTTISH (391.1 m.)

Wednesday, June 21st.—Scottish Dance Music.

Thursday, June 22nd.—Guilty or Not Guilty: Gaelic play by Mary A. Campbell.

Friday, June 23rd.—Excerpt from the Summer Show at the Theatre Royal, Edinburgh.

Saturday, June 24th.—Peebles March Riding and Beltane Festival: a recorded impression.

### NORTHERN IRELAND (301.1 m.)

Wednesday, June 21st.—Stop Dancing—variety programme.

Thursday, June 22nd.—Sacred Service, by Ernest Bloch, from St. Anne's Cathedral, Belfast.

Friday, June 23rd.—Irish Rhythms.

Saturday, June 24th.—Orchestral Concert.

## AMERICAN TELEVISION PROGRESS

VARIOUS reports keep filtering into this country concerning the progress of television in the United States since its inauguration on April 30th. Unbiased British observers who have visited the States to view the results, however, are unanimous in stating that they are of a much lower standard than that enjoyed here. Even so, it is interesting to take note of the various reactions provided by the widely differing interests, who in one way or another will participate in the television service. One cable from New York states that Joseph M. Schenck, chairman of 20th Century Fox Films, is prepared to participate actively in television through its interest in Gaumont and Baird.

### Studio Building

The studio building plan which was launched three years ago by that company provided for television in its stage construction. On the other hand, one prominent authority rather pessimistically says that television has now come forth owing its development past about four million pounds, enjoys a great fame but slight performance, and consists essentially of sales promises, anticipations, hopes and promotions. Then, again, the major distributors have refused to supply even old shorts for television purposes. Because of this an N.B.C. official stated that motion picture companies could not break television by obdurately refusing to provide the new industry with films. Neither can picture interests solve the problem of what effect television will have on the film business by dodging the new art. It has, therefore, been suggested that for its own welfare the picture industry should enter into a short period of collaboration with television, and weigh the lessons learned before deciding to cut television cold. Perhaps the film people in the States have taken their cue from what has happened in this country, but even those people with short memories can recall the spirited opposition offered by the film industry to the introduction of sound.

# Programmes from Start Point and Clevedon

**W**EDNESDAY, June 14th. was the opening day of the new transmitters at Start Point and Clevedon, taking the place of Bournemouth and Plymouth. Bournemouth was opened on October 17th, 1923, and Plymouth on March 28th, 1924. The official opening of these two stations was carried out on the day mentioned by Sir Allan Powell, chairman of the Governors, who called upon the Duke of Somerset to open the transmitters. There was no ceremony at Clevedon, but the Lord Mayor of Bristol (Alderman W. A. Winchester) was one of the chief guests of the Corporation at the opening ceremony at Start Point and he made a speech of welcome to the new broadcasting service. The

I. W. Dickenson) also spoke. The Corporation's thanks were conveyed to the speakers by the Chief Engineer of the B.B.C., Sir Noel Ashbridge.

### Start Point Station Details

The following is a brief description of the Start Point Transmitting Station. Its function is to provide an improved Regional programme service in a district comprising the counties of Cornwall, Dorset, the southern parts of Devon, Somerset, Wiltshire, and Hampshire, and the South Coast to the East as far as Sussex. In conjunction with the new transmitting station at Clevedon, in Somerset, it supersedes the low-power transmitters at Plymouth and Bournemouth, which provide only a strictly local service, and the 285.7 metre transmitter at Washford, which has radiated the Western programme since July, 1937. The wavelength used by Start Point will be 285.7 metres (1,050 kilocycles per second), and its power will be 100 kilowatts. The building is similar in plan to other recent B.B.C. high-power sta-

tions. It has a single storey, except for the office block at the front which has two storeys. The arrangement of the apparatus inside the building also follows previous practice. The rotating machinery is kept away from those parts of the building where quietness is essential, such as the control room, where the quality of the programme is checked, and the offices.

Careful thought has been given to minimising the programme time lost due to breakdowns. Spares are provided for all the important items of apparatus, and are arranged so that they can be quickly brought into use.

The front part of the building contains the offices, staff mess-room, valve store, a quality checking room, and the control room. The control room is connected by high-quality telephone lines to the Plymouth studios and thence to Bristol and the simultaneous broadcasting network. In the control room the programme is passed through amplifiers which increase its volume to that necessary for the transmitter. There is a programme control position at which control and switching operations are carried out.

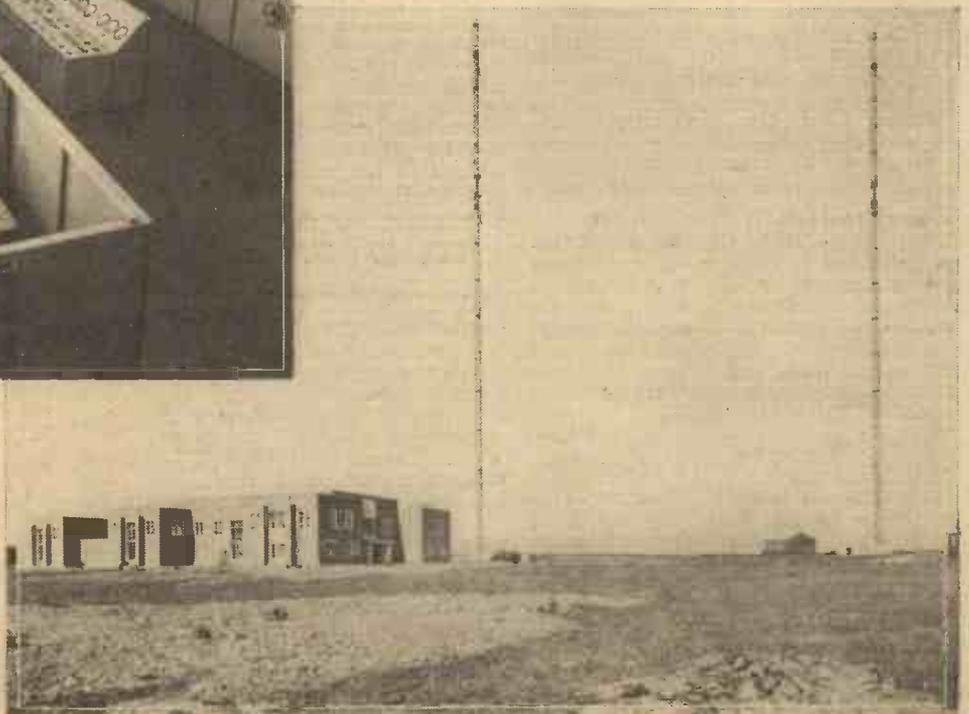
A studio is provided for emergency use and for testing, as at other B.B.C. transmitting stations.

In this part of the building there is a room containing the quartz crystal drive unit which keeps the wavelength of the transmitter constant to a very high degree of accuracy. To prevent the wavelength changing, the temperature of the crystal must be kept constant within a small fraction of a degree. The crystal is therefore contained in a specially designed oven which is heated electrically, the temperature being controlled by a thermostat.

(Continued overleaf)



Above is the Transmitter Hall of Start Point Transmitting Station, seen from the gallery. The transmitter centre and control desk is on the right, and on the left the modulation transformer and plate feed reactors. The picture on the right shows the station buildings and masts.



## PROGRAMMES FROM START POINT AND CLEVEDON

(Continued from previous page)

### The Transmitter Hall

This contains the transmitter itself, apparatus for regulating the high-tension, filament and grid-bias supplies and part of the high-tension smoothing equipment. The transmitting valves and circuits are in a metal enclosure which has glass windows let into the front so that meters and other units can be seen. For the safety of the staff, all the enclosures containing apparatus at high voltage are protected by electrical and mechanical interlocks so that they cannot be entered until the high-voltage supply has been disconnected and the apparatus made safe.

Facing the transmitter is a control desk at which the various power supplies to the transmitter are regulated. The motor-generators in the next room can be started and stopped from here and the spare machines brought into use.

### The Machine Room

The voltage of the mains supply in the building is 440 volts, but to operate the transmitter various voltages are required, up to a maximum of 14,000 volts for the main high-tension supply. These voltages are produced by motor-generator sets in the machine room. Each machine is duplicated in case of breakdown and can be started by hand from a switchboard in the machine room, although this is normally done from the transmitter control desk.

### Power Supply

Power for running the station is normally taken from the mains of the Borough of Torquay Electricity Undertaking. A standby generating set is, however, installed in the building for use in the event of the public supply failing. This is a Diesel engine driving an alternator which generates enough power to operate the whole station. Provision is made on a switchboard in the engine room for a rapid change over from the normal supply to the standby.

Oil for running the Diesel engine is stored in two tanks at the rear of the building. These have a combined capacity of 80 tons.

### The Aerial

The aerial system is different from any previously used by the B.B.C. The programmes are actually radiated from the two masts, which are insulated from earth; there are no wires stretched between the

masts as in older types of aerial. The reason for having two masts, instead of one as at other recent B.B.C. stations, is that it was particularly required to extend the area served by the station in an east-west direction, and this meant using an aerial which did not radiate equally in all directions.

The directivity of the aerial system is governed by the spacing of the masts and the circuits by which the output of the transmitters is conveyed to them.

Another point of interest is the division of each mast by an insulator at a height of 310 feet from the ground. By connecting suitable apparatus between the upper and lower parts of each mast the "anti-fading" properties of the aerial can be adjusted to obtain the best results.

It should be explained that the use of an anti-fading aerial does not mean that at considerable distances there will be no variations in the strength of reception from the new transmitter at night. However, the range at which serious fading is likely to occur will be greater than if one of the older types of aerial were used.

Each mast carries the usual red aircraft-warning lights.

### Clevedon Station Details

Clevedon has been modelled very closely on the B.B.C.'s new transmitting station at Aberdeen which was opened last September, although the power of the transmitter, 20 kilowatts, is higher than that of Aberdeen. The single storey station building is of modern design and is built of brick with an external rendering of cement. Its size is approximately 44 feet by 17½ feet, and it contains a transmitter room, machine room, control room and various subsidiary rooms.

The programmes arrive in the control room over special high-quality telephone lines from the Bristol studios, and may either originate there or come from some other part of the country by way of the simultaneous-broadcast line system.

The control room contains amplifiers to increase the volume of the programme, a radio-check receiver and general testing apparatus on one side, while on the other side is a quartz crystal drive unit, similar to the one at Start Point, which keeps the transmitter exactly on its allotted wavelength of 203.5 metres.

From here the programme passes to the transmitter room, from where there is an enclosure containing the transmitter itself, and facing this a desk at which the programme is controlled and checked. This differs from the practice at most B.B.C. stations where the programme control desk is in the control room. The pro-

gramme is listened to continuously on a loudspeaker in the transmitter room so that any deterioration in quality is immediately apparent. Apparatus is provided for the quick location of any faults which may occur.

The adjacent machine-room contains a switchboard to which the incoming power supply is brought for distribution to the apparatus throughout the station. Here also are the motor-generator sets which provide the low-tension supply for the water-cooled valves in the transmitter. A small room leading out of the machine-room contains the pumps for circulating the water used to cool these valves.

A feature of the station is the remote-control panel built into the front of the transmitter. By means of push-buttons on this panel the pumps which circulate the cooling water can be started up, then the motor-generator sets in the machine-room, and finally the various transmitter power supplies can be applied and regulated. Normal hand-operation is available as a standby.

As at other B.B.C. stations the most important parts are duplicated and arranged so that the spare equipment can be brought into use with the minimum delay.

### The Aerial

Following modern practice, this consists of a single mast, insulated from earth at the base, from which the programmes are actually radiated. The output of the transmitter is brought by a tubular feeder to the small building near the base of the mast which contains the aerial-coupling circuits connected to the mast itself. The mast is 375 feet high and has at the top six radial arms which are hinged and can be raised or lowered to allow the "anti-fading" properties of the aerial to be adjusted. Red lights on the mast serve as a warning to aircraft.

Special precautions have been taken to reduce the likelihood of damage to the station from lightning.

### The Power Supply

The power supply for the station is obtained from the mains of the North Somerset Electric Supply Co. Ltd., at a pressure of 11,000 volts A.C. This is transformed in a substation on the site to 400 volts and to 230 volts for operating the apparatus in the station.

### Water Supply

The water supply for the station is obtained from the mains of the Clevedon Water Company.

### Jo'burg to Have a New Station

THE South African Broadcasting Corporation is inviting tenders for the construction and installation of a powerful short-wave transmitter to replace the 5-kilowatt station ZRH now in use at Roberts Heights. Short-wave broadcasts of the Johannesburg (Union of South Africa) programmes from ZTJ are now being made on 49.94 m. (6.01 mc/s).

### Country Journeys

S. P. B. MAIS will give the first talk in a new series entitled "Country Journeys," to be broadcast on June 26th. Although he knows Somerset well, he made a special journey over the Quantock Hills for the purpose of this broadcast, and, as he is both energetic and conscientious, he went over them in the only way in which the traveller can truly see the variety of their appeal—that is by walking. He visited, among other places, Alfoxton where Words-

## ITEMS OF INTEREST

worth lived and wrote, and in his talk he will tell listeners about the past of the hills as well as the glories of their present appeal to the visitor.

### W8XAL on a New Schedule

A NEW transmission schedule has been announced for W8XAL, short-wave international station operated by the Crosley Corporation, Cincinnati. The 10,000 watt short-wave outlet is now relaying WLW programmes at the following times:

Sundays from 8 a.m. to 6.30 p.m., and from 11 p.m. to 2 a.m. E.S.T.

Mondays and Thursdays from 5.45 a.m. to 2 a.m., E.S.T.

Tuesdays, Wednesdays and Fridays from 5.45 a.m. to 5.30 p.m., and from 11 p.m. to

2 a.m., E.S.T.—Saturdays from 5.45 a.m. to 11 p.m., E.S.T.

Plans for a new dual transmitter of 50,000 watts power for W8XAL are being carried forward by engineers, who expect to inaugurate directional beam service to all parts of the world late this year. The station will be the second most powerful short-wave outlet in the United States, with access to six different broadcasting frequencies.

### Student Songs

ON June 28th (National) the B.B.C. Men's Chorus, conducted by Leslie Woodgate, will broadcast a programme of Student Songs, arranged by Leslie Woodgate. Stuart Robertson (baritone) will be the soloist, with Ernest Lush at the piano-forte. On June 29th (Regional) the B.B.C. Singers, conducted by Leslie Woodgate, will broadcast a programme of English Madrigals.

# ON YOUR WAVELENGTH

## The Legion of the Lost

I WAS reading a Sunday paper the other day, and noticed advertisements for missing relatives, and it occurred to me that someone ought to devise some scheme so that the radio can be used for that purpose. I think by now that almost everyone in the world at some time or another listens in to wireless, and thus there could be no surer method of tracing missing relatives, particularly if such messages were sent out on Sunday when most people are at home.

I realise all the difficulties, for people who have merely gone away for a week or two without informing someone of their whereabouts, might cause anxious relatives to have the names broadcast when there is no need to do so. I do not think it would be impossible to devise some system of careful vetting of applications for broadcast requests for information regarding missing relatives, and perhaps even a small charge could be made for the service. I believe the matter has been considered by the B.B.C. on a number of occasions. There is no reason, however, why some of the Continental commercial radio stations should not undertake such a system. The names would, of course, be announced in alphabetical order, with the time programme to be announced for the A's, B's, C's, and so on.

## The Radio White List

THE radio trade, like many others, has suffered a good deal at the hands of incompetent dealers. Unfortunately, the law is such that it is illegal to publish a black list, although it is, I think, in order to publish a white list, if it is presented in a certain way. It is necessary to be very careful, however, even with a white list, because the omission of a man's name from it might be taken to imply that he was virtually on a black list. After all, if the reasons for being on a white list are that the dealer concerned is known to be reputable, the implication is that those not on it are not reputable.

The white list has, therefore, to be published in such a way that it contains a disclaimer which states that the absence of a name from the list does not imply that the absentee



By Thermion

is not reputable. Thus, the value of the white list is largely lost.

Now for some time past the radio trade has been endeavouring to purge the retail side of certain dealers who do not comply with fair trading conditions, but at a meeting held recently the Retail Distributors Association, which represents most of the larger retail stores in Gt. Britain, and has members throughout the world, the statement was issued that they could not subscribe to the undertaking laid down in the terms of the agreement issued by the set makers sections of the R.M.A.

I do not know whether further steps will be taken.

## The Viewers go to Tea

I LIKE the idea which the B.B.C. has instituted of inviting a number of regular viewers to tea as they will with their first television tea-party on June 22nd. At this tea-party the viewers will meet members of the Alexandra Palace staff and exchange views and opinions on the television service, whilst Mr. Gerald Cock, the Director of Television, gives an address. These parties are limited to 150 people, and they start at 4.30 p.m. with tea. Then Sir Stephen Tallents, B.B.C. Controller of Public Relations, takes the Chair, and Mr. Cock speaks.

I believe that it is the hope to include television announcers amongst the visiting staff, and members of the party will be permitted to talk to some of the producers.

The B.B.C. considers that this opportunity for personal contact will enable them to gauge the public's likes and dislikes.

## Radio in the Census?

RUMOURS are current in America that in the next American Census information concerning radio

will be included amongst the items. The next American Census will be in 1940, but as long ago as 1930 the R.M.A. was instrumental in securing in the census of that year a question on the wireless installed in the home. The American scheme will include this question, and probably an additional one regarding car radio.

## Radiolympia

STEPS are already being taken to ensure the success of this year's radio exhibition. Many useful suggestions have been put forward, and I am now pleased to note that the organisers are anxious to look with favour upon any really constructive efforts on the part of important press publications to present Radiolympia as a big feature to the public—either during or just prior to the Show. It is believed that one or two papers are already well advanced with special ideas on the subject. Any ideas in this connection should be forwarded to the Exhibition Committee, who will consider them as sympathetically as possible. We shall, of course, be at our usual position and hope to see old and new readers turn up in strength as usual. I understand from the Editor that some interesting new receivers will be on view and that the usual arrangements will be made to answer all problems which may be put to the staff. Once again, I ask you to make a note of the date in your diaries—August 23rd to September 2nd, both dates inclusive.

## Transmitting Jargon

I WAS trying out a new short-wave receiver the other night and chanced upon the 40-metre amateur band. I was surprised at the waste of time and energy on the part of a large number of those whom I chanced to hear. The use of "Old Man" after every sentence; the lack of clear thought evidenced by the long-drawn-out "er, 'er, er's" in everything that was said, and what to my mind was much worse, the continued use of telegraphic terms in ordinary conversation gave an indication that transmitting licences are apparently being issued *ad lib.* F.B. is a telegraphic symbol for "fine business," yet I heard several amateurs refer to receivers as "Very F.B."

jobs." Surely it is just as easy, and more correct, to say "Very fine jobs." Similarly, I actually heard one amateur, during his conversation, repeatedly say "Hi, Hi," indicating laughter. Standard "Q" code abbreviations are quite in order, and in long-distance work, or where signals are weak, may lead to greater intelligibility, but even so they are in many cases totally unnecessary in telephony working. Another point I noted was the lack of evidence of experiment. Many of the conversations were purely of a friendly nature, and beyond mentioning the weather conditions (very briefly) and the signal strength, it appeared that the main idea was merely to make as many contacts as possible in the shortest space of time, without any attempt to judge performance or to test transmitter or aerial efficiency. I understood in the old days that the authorities listened periodically to amateur signals, and in view of the congestion on the amateur bands I wonder that some curb has not been placed on the activities of some amateurs. Incidentally, I was also surprised to note the small number of amateurs using the key, and the bad sending of those who were employing this form of transmission.

#### Letter from a Reader

I HAVE received the following letter from "Torch," of Birkenhead :

I am sure you will be pleased to hear that I have joined the Anti-Evisceration League! How long my membership will last I cannot say, but it will at least save you from any further agony for the moment. Actually, the reason governing my exemplary restraint is that I don't want to presume on your good will and assistance. Strictly between ourselves, I am willing to agree that too much "Torch" might become a trifle over-heating; and if his effusions are a little less frequent, will they not become all the more precious on that account? I can almost hear you say: "They will!"

This time it's just to tell you how much I agree with your remarks *re* television campaign. Keep up the good work!

I positively squirmed with joy at those few words in which you remark that you don't see how anything which is satisfactory can be improved. How is that for "evisceration" by your respected self? You got 'em that time, brother! It's one of those subtle remarks for which there is no answer.

As the late Dr. Watts did not remark: How can perfection better be? our Thermion brave inquires; And, mortified beyond all hope, the B.B.C. expires, So keen are they to check mistakes in "English as she's spoken," And then, to Thermion's huge delight, their own rules they have broken. Says he: In "satisfactory" things how can "improvement" be? For "satisfactory" means the best—it makes no sense for me!

(Continued; in last column.)

## Notes from the Test Bench

WHEN using up old lengths of flex it is generally found that the metal is tarnished and that the outer cotton covering is partly perished. The result is that when a portion has been bared for connection purposes, "whiskers" of cotton are left which render the appearance untidy, and furthermore, soldering cannot be easily carried out owing to the difficulty of cleaning the wire. A penknife should not be used as there is a risk of cutting through one or more strands and in some circuits the unconnected ends may give rise to trouble. The rubber should be carefully scraped away and a match held to the cotton ends. They will flare up quickly, but the flame should not be allowed to remain for too long or the copper wire strands will be annealed. Blow out the flame and it will then be found that the cotton ends will rub off, the charring having broken them down and the slight heat will have affected the tarnished wires. They should then be passed between a piece of old emery cloth held between the finger and thumb, which should bring them up quite bright and clear for soldering. Use a good flux.

#### Cutting Large Holes

WHEN mounting meters or similar large components on panels or chassis, some difficulty is experienced if a large washer cutter is not available. A trammel may be cut from stiff metal and a cutting point made from a gramophone needle. This should be rotated several times with pressure, and the panel or chassis turned over and the process repeated from the other side. In all but thick steel, this will be found to score deeply enough to enable the disc to be torn out by drilling a small hole at one point, lifting the edge and gripping with flat pliers. The deep score will act as a guide and very little cleaning up will be called for afterwards.

#### Black Crackle Finish

IT is fashionable now to use panels and cabinets with a black crackle finish. Old aluminium panels which are being used up may be modernised by filling the holes with any plastic metal and then painting the panel with black crackle paint. The holes will be rendered practically invisible and the panel may be drilled for further use, care being taken, of course, to avoid making a fresh hole running into one of the original holes, as this may cause the filling to fall out. Aluminium solder or ordinary solder may be run into the old holes, laying the panel flat on a bench whilst the hole is filled, and smoothing up after it has set.

To say the best's "improving" that's contradiction flat—  
These experts in the English tongue,  
what are they getting at?  
There's no reply—there isn't one—when  
Thermion, smiling, cods  
The B.B.C., we see once more that even  
Homer nods!

#### An Historic Collection

STUDENTS of electrical history will be interested to note that two additions recently made to the Ediswan Collection of Historic Lamps are a Cooper Hewett mercury vapour lamp and a Nernst "Lunar" pattern lamp. The Cooper Hewett dates from 1908 and is, therefore, one of the first practical mercury vapour lamps put into commercial use. It is the tilting type which operated in the horizontal position on 200-volt circuits at 2 amps. and gave a 1,200 candle-power light intensity. The lamp stood up to seven years' service in the dye house of Messrs. Wood and Burt, of Holmfirth, who are the donors, before it was replaced by tungsten filament lamps. The lamp is about 24 ins. long and apart from a small hole through which all the mercury has escaped, is in an excellent state of preservation.

The Nernst lamp, with the orthodox Nernst rare metal oxide filament, is one of the more elaborate patterns introduced anterior to 1907. This lamp was given by Mr. Arthur Douglas, of Kirk Ella, Yorkshire.

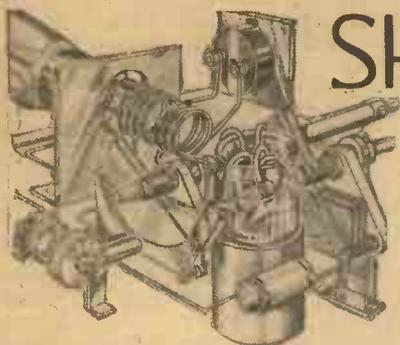
#### News Bulletins in European Languages

I AM informed by the B.B.C. that as from June 14th a late news bulletin in Italian is being given from 10.45 to 11 p.m. (B.S.T.), on weekdays and Sundays, and will be broadcast from five medium-wave Regional stations and from two short-wave transmitters at Daventry.

In future, all foreign news bulletins on medium waves will be transmitted from the Welsh Regional transmitter instead of from the West Regional transmitter as hitherto. Transmissions will continue from the London Regional, Midland Regional, North Regional transmitters, and from Stagshaw, as before.

On weekdays the timing of the late French and German bulletins remains unchanged, at 10 p.m. and 10.15 p.m., respectively. On Sundays, however, the late French bulletin is broadcast at 10 p.m. on short waves only, and the German news broadcast on medium and short waves will begin at 10.30 p.m. instead of at 10.15 p.m. as on weekdays.

The early bulletins in French, German, and Italian continue as before to be radiated on the short waves only from 8.15 to 9.0 p.m. on both weekdays and Sundays.



# SHORT-WAVE SECTION

## A TEN AND TWENTY-METRE SET

How to Obtain Maximum Efficiency on the Shorter Wavelengths with a "General-purpose" Short-waver. By W. J. DELANEY.

**M**ANY constructors build short-wave receivers which might be termed "General-purpose" sets, since they are designed to cover all wavelengths below 100 metres or so. This is quite in order so long as no attempts are made to get below about 15 metres. Some receivers will, of course, give quite good results down to 10 metres, but the particular requirements of apparatus for these very low wavelengths are such that when it is desired to gain good efficiency on that band it is desirable to start from that end and design the receiver for that purpose. Amateur transmitters, and those who wish to listen to them, will use the 10, 20 and 40-metre bands most frequently, and station searching on the 10-metre band is not too simple with a normal type of short-wave set. Apart

provision must be made for taking the standard 20 and 40-metre coils, and it is suggested that the small stand-off insulators be wired direct on the tuning condenser with sockets inserted in the top of the insulators. A standard 4- or 6-pin coil-holder should then be fitted with two pins so that it may be inserted in place of the special coil, and a standard coil can then be used in the normal manner. To mount the insulators on the standard condenser to obtain correct spacing for the pins (mounted in the screw holes of a standard coil-holder) small metal brackets will usually have to

a condenser of .0001 to .0002 mfd. is used for a preliminary setting and a very small variable connected in parallel with it for a fine adjustment. It is now suggested that a variable of 18 mmfd. or less be used for this purpose, and the special coil-mounting device be connected to this condenser. The band-setter should be placed as close as possible to this, and then when tuning on the 10-metre band the band-setter should be set to zero (or minimum capacity), and all tuning effected on the small condenser. This will, of course, not provide the same wide tuning range, but will give very much better tuning, and by using further coils to cover the range between, say, 10 and 20 metres, a better L/C ratio will be obtained with improved signal strength. Furthermore, each small band can be individually adjusted for reaction, aerial coupling, etc., and difficulties due to "dead spots," etc., will be overcome.

On most short-wave sets a series aerial condenser is used and it is often found that whilst this may be adjusted to provide smooth reaction and all other desirable features on one waveband, it has to be re-set

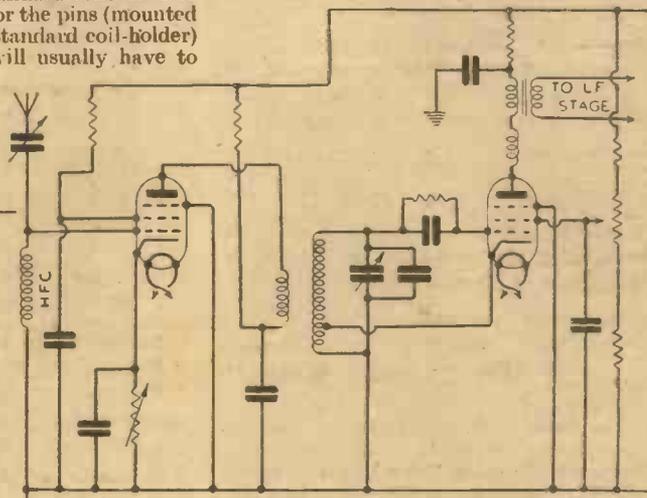
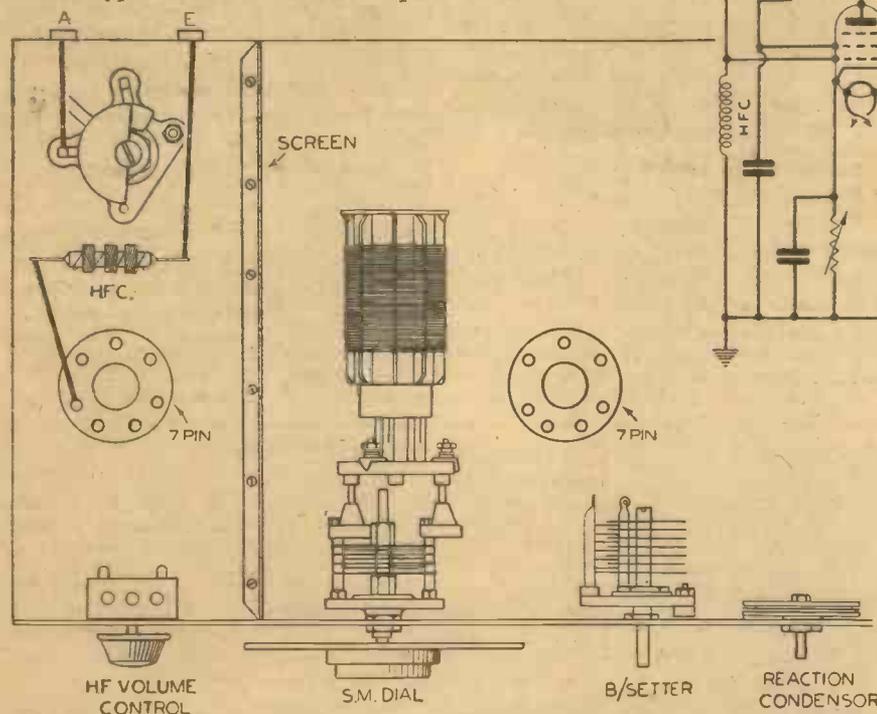


Fig. 1 (above).—Skeleton theoretical circuit, and Fig. 2 (left).—Practical layout of short-wave receiver as described in this article. The method of coil mounting is shown in Fig. 3 on the following page.

from the quest on of "dead spots" and losses, there is the problem of tuning, and the following ideas are introduced with a view to simplifying the operation of tuning on 10 metres so that a performance comparable with a standard short-waver may be obtained.

### Coil Problems

Standard 4- or 6-pin plug-in coils may be obtained for use down to 9 metres. Better results on 9 or 10 metres are obtained with an air-spaced self-supporting coil, and if the standard type of coil-holder is eliminated wiring may be reduced, thereby enabling more wire to be put on the coil with a consequent increase in inductance and better signal strength. This means that some

be constructed, and the sizes and shapes will depend upon the particular tuning condenser.

The coils for 10 metres should be wound with the 16 or 18-gauge tinned copper wire usually employed for wiring purposes, and the required number of turns (dependent upon the diameter) should be held in position with a strip of celluloid attached by Durofix. A suitable diameter is 1in. Provision for reaction or primary windings will again depend upon the type of circuit and general tuning arrangements which are adopted.

### Tuning Arrangements

The usual form of short-wave tuning is that known as "band-spreading" wherein

for the other bands, and thus exact settings or calibrations cannot be easily carried out. If the new scheme is adopted, the reaction or primary windings may be adjusted on the coils themselves, and then by using a large slow-motion dial for the small tuning condenser, and a small dial only for the band-setter, a reliable calibration chart may be drawn up for all coils. In an experimental receiver built on these lines which has been in use for some time at my station the 10, 20 and 40-metre amateur bands are covered by exactly one revolution of the large Eddystone Dial, type 1,070, the 10-metre coil being so wound that it only covers this particular amateur range. It is, of course, possible to wind coils so that the broadcast stations are also covered on the coil ranges in question, but where a receiver is to be used in conjunction with a transmitter for accurate logging, the new idea will be found preferable. The dial may be interpreted into terms of kilocycles, and accurate readings of the divisions of the amateur bands can then be made.

### Wiring and Modifications

All wiring must, of course, be rigid and short, especially in the tuned circuits.

(Continued on next page)

## Leaves from a Short-wave Log

### New Venezuelan Wavelengths

MANY of the Venezuelan stations strung out on wavelengths between 44 and 55 metres have been allotted higher channels. YV5RN, Caracas, now 10 kilowatts, is easily captured on 59.52 m. (5.04 mc/s). Other stations which the authorities have moved up are: YV5RM, 59.88 m. (5.01 mc/s); YV5RO, 60.73 m. (4.94 mc/s), and YV5RU, 60.98 m. (4.92 mc/s), all in the Venezuelan capital.

YV3RX, *La Voz de Lara*, now 2 kilowatts, at Barquisimeto, has replaced YV3RA, and is operating on 60.12 m. (4.99 mc/s). A new station, YV3RN, has also been opened in that city and is testing on 62.24 m. (4.82 mc/s). From Barcelona, the call: YV6RE, has been heard on 62.76 m. (4.78 mc/s), and the station announces a power of 500 watts; YV1RJ, *Radio Falcon*, installed at Coro has been logged on 60.36 m. (4.97 mc/s), also YV1RK, *Radio Popular*, Maracaibo, on 50.59 m. (5.93 mc/s). Care must be taken not to confuse the Venezuelan with the Colombian broadcasters which are now also using the same section of the waveband.

### The Bombay and Delhi Channels

LISTENERS who wish to hear the broadcasts from British India should turn to VUB2, Bombay, on 31.4 m. (9.55 mc/s) between B.S.T. 03.30-04.30; 08.00-10.00 or 11.00-12.00; also on 61.48 m. (4.88 mc/s) between 13.30 and 18.00. Delhi broadcasts simultaneously through VUD4 on 19.62 m. (15.29 mc/s), and VUD2 on 31.28 m. (9.59 mc/s) between B.S.T. 03.00-09.30, and through VUD2, 31.28 m. (9.59 mc/s), and 60.49 m. (4.96 mc/s) from B.S.T. 13.30-18.00.

### Daventry Empire Broadcasts

THE frequencies now used by the Daventry short-wave broadcasters are the following: GST, 13.92 m. (21.55 mc/s); GSJ, 13.93 m. (21.53 mc/s); GSH, 13.97 m. (21.47 mc/s); GSV, 16.84 m. (17.81 mc/s); GSG, 16.86 m. (17.79 mc/s); GSP, 19.6 m. (15.31 mc/s); GSI, 19.66 m. (15.26 mc/s); GSO, 19.76 m. (15.18 mc/s); GSF, 19.82 m. (15.14 mc/s); GSE, 25.29 m. (11.86 mc/s); GSN, 25.38 m. (11.82 mc/s); GSD, 25.53 m. (11.75 mc/s); GRX, 30.96 m. (9.69 mc/s); GRV, 31.25 m. (9.6 mc/s); GSC, 31.32 m. (9.58 mc/s); GSB, 31.55 m. (9.51 mc/s); GSL, 49.1 m. (6.11 mc/s), and GSA, 49.59 m. (6.05 mc/s). Through these various stations the British broadcasts in English and foreign languages are almost continuously on the air throughout the 24 hours.

### Radio Guadeloupe Changes Wavelength

FG8AA, Pinte-a-Pitre, Guadeloupe (French West Indies), in a recent broadcast announced that the programmes were now being transmitted on 7.44 mc/s (40.32 m.) instead of 42.5 m. (7.058 mc/s). The station works daily from B.S.T. 12.00-13.00, and again from midnight to 01.00. The strongest signals are heard during the second transmission.

### Norway's New Frequencies

FOR its short-wave radio network the Norsk Ringsvingkasting has officially announced that the following call-signs and frequencies have been allotted to

the new Jeløy and Oslo stations: LKZ, 13.95 m. (21.5 mc/s); LKY, 13.98 m. (21.46 mc/s); LKX, 19.77 m. (15.175 mc/s); LKW, 16.99 m. (17.755 mc/s); LKV, 19.78 m. (15.17 mc/s); LKU, 25.36 m. (11.83 mc/s); LKQ, 25.56 m. (11.735 mc/s); LKE, 31.34 m. (9.572 mc/s), and LKC,

31.48 m. (9.53 mc/s). The power of LKX and LKC is 50 kilowatts.

### Chungking on 17 Megacycles

XGOX, Chungking (China), now transmits daily between B.S.T. 03.00-04.00 on 16.85 m. (17.8 mc/s) with a power of 35 kilowatts.

### Radio Sofia

THERE are not many broadcasters on the 8-megacycle band, but a search on this section of the condenser dial will soon reveal LZA, Sofia (Bulgaria), on 35.44 m. (8.465 mc/s). Announcements in several languages are made in a feminine voice, and the call is put out at regular intervals. The station is seldom late on the ether, and usually closes down towards B.S.T. 21.30.

### La Voz de la Provincia

COGF, Matanzas (Cuba), has reappeared in the log; it is working on 25.42 m. (11.8 mc/s), and may be easily mistaken for CBI180, Santiago, Chile, which is to be found on the same channel. Both, unfortunately, use chimps as an interval signal, but the latter station alternates with a bugle call occasionally. Slightly higher up the scale listeners report the reception of Rad'o Rancho Grande, which would appear to be the call of OAX42A, Trujillo, in the Republic of Peru, given as operating on 25.44 m. (1.79 mc/s).



A close-up of Madame Tabouis, the famous French political columnist, speaking into the microphone at Broadcasting House recently. Madame Tabouis enjoys an almost legendary reputation for her political forecasts, many of which have been correct in the past.

## SHORT-WAVE SECTION

(Continued from previous page)

Sixteen or 18-gauged tinned copper is best, and for the aerial condenser the Eddystone type 957 condenser is desirable, and this may be mounted on the base-board or chassis, between the aerial and first grid. An aperiodic H.F. stage should be used, with a reliable choke between earth and the grid of the H.F. valve. A variable-mu valve with adjustable bias will enable volume control to be effected and by this means the reaction control may be turned up to the desired point to give maximum volume, and when a powerful station is heard, instead of backing off reaction the H.F. volume control is employed. This is a further advantage in accurately calibrating the set as reaction in most cases affects the setting of the tuning condenser. If reaction is always set to one position no variation in tuning will take place.

The H.F. stage must be screened to avoid interaction with the detector stage wiring and consequent tuning shift. Reaction

control by means of a variation in the screen voltage of an H.F. pentode is the ideal arrangement for a receiver of the type mentioned, and a diagram is given in Fig. 1

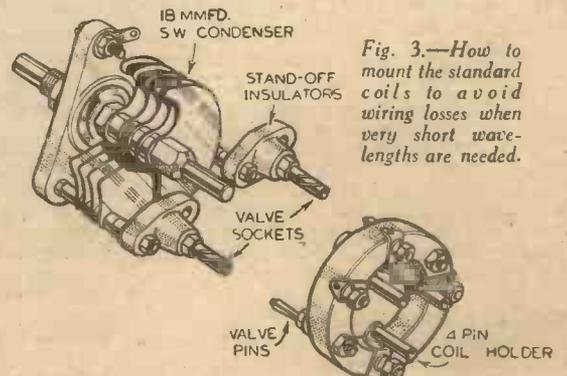


Fig. 3.—How to mount the standard coils to avoid wiring losses when very short wave-lengths are needed.

with the layout to be adopted shown in skeleton form in Fig. 2. The model in use is A.C. operated, but a battery receiver may be built on exactly similar lines, and valves of any desired make may, of course, be used.

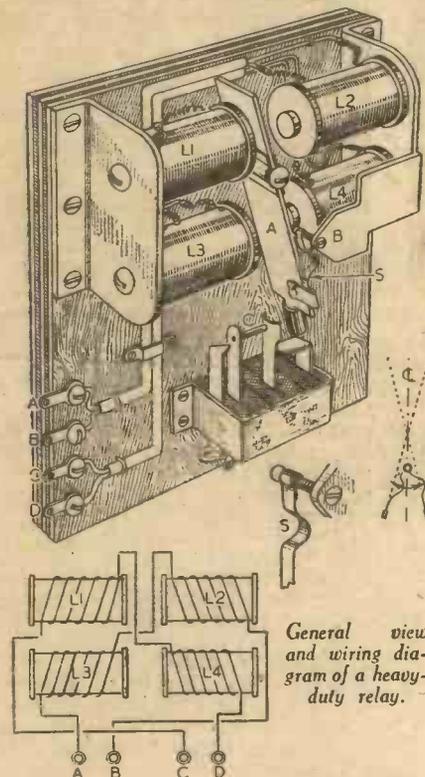
A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

**A Heavy Duty Rocker-type Relay**  
 TWO disused bell movements having removable pole pieces made possible the biased rocker action relay illustrated in the accompanying sketches, the construction being as follows. Slipping the bobbins from the removed poles, these



were rewound with a thinner gauge of enamelled wire until each bobbin was practically full, then after resetting the bobbins on the poles, securing with a little glue as they were rather loosely fitting in the first instance, I then shaped two aluminium brackets, one of these being provided with a bearing bracket or lug "B" for the tension spring fitment.

After determining the extent of the influence of the polarised coils on a "hook-up" a suitable baseboard was marked out and a soft iron armature "A" centralised, as depicted.

The action of the tension spring was assisted by making the armature engaging end slide in a slot, provided by bending over and soldering a short piece of tin to the armature, as shown.

The other end of the spring "S," which, by the way, was broken off an old clock spring, is freely bent round a 6BA screw, this being accomplished by heating. To the tip of the bearing screw is made a blob of solder to keep the spring in position.

The contact bank comprises a few pieces of ebonite and a simple nickel contact assembly obtained from odd parts from

**THAT DODGE OF YOURS!**

Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1.10.0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL AND AMATEUR WIRELESS," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be original. Mark envelopes "Radio Wrinkles." DO NOT enclose Queries with your wrinkles.

**SPECIAL NOTICE**

All wrinkles in future must be accompanied by the coupon cut from page iii of cover.

the junk box, two of these contacts being fitted with a buffer of ebonite. This combination gives a forward "make," and a "back" contact.

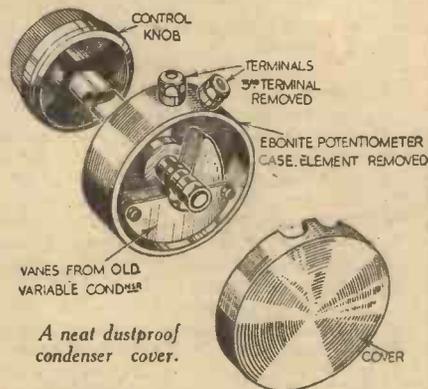
The practical wiring diagram gives in schematic form the coil relationship, and from this it will be seen that the coils are series connected, L1 to L4 and L2 to L3. When, as the armature is drawn over, the centre is passed (see the inset diagram) the spring accelerates the action and keeps the armature over both ways.—S. L. WHITE (Walthamstow).

**A Dustproof Condenser Cover**

A NEAT dustproof cover for small condensers can be constructed from an old potentiometer case. Remove the element from the potentiometer, and build a variable condenser in its position; any

number of vanes are used, according to the capacity desired. Two of the three terminals are used for wiring, while the third, which is not used, can be removed, and the hole plugged.

The centre spindle is passed through the



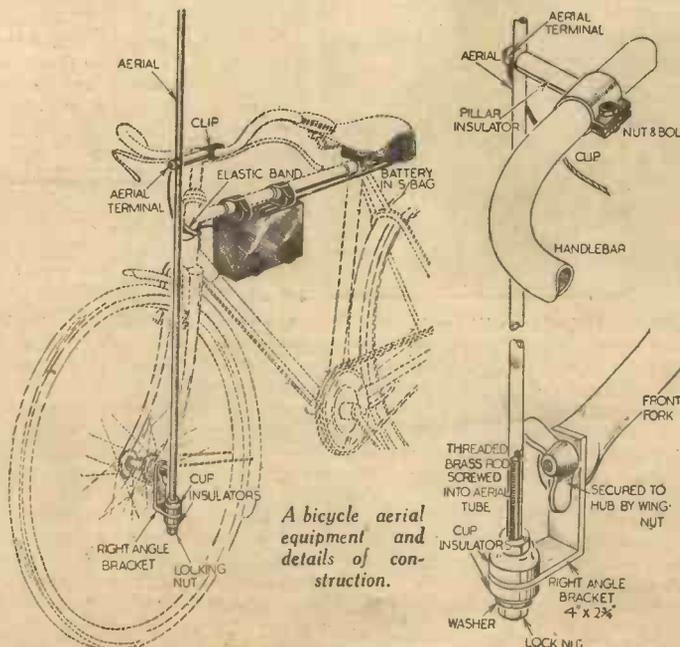
A neat dustproof condenser cover.

centre hole of the potentiometer case and a knob attached to it. The back is then placed in position after slots have been made for the recessing of the terminals.—A. C. FRIMMALL (Tring).

**A Bicycle Aerial**

THE accompanying sketches give details of a bicycle aerial which I have made and used with success. I am using with this aerial a two-valve set S.G. det., transformer coupling and pentode output. For H.T. I am using 4 9v. G.B. batteries and a small 2-v. accumulator for L.T.

I find this aerial gives quite good headphone strength on the local station up to a distance of 15 miles (while riding). Beyond this distance a throw-out aerial must be used while the bicycle is stationary; or if one should be in the vicinity of overhead telephone wires, by using the aerial on the bicycle and stopping the machine as near as possible beneath these wires excellent results can be obtained. Constructional details and method of fitting the aerial to the bicycle are clearly shown in the illustrations.—J. JUDGE (Belfast).



# CAR-RADIO REC

IT is clear from the number of requests received by the Editor of this journal for constructional details of a "simple car-radio receiver" that many readers do not appreciate the difficulties which confront the designer of a car receiver suitable for home construction. Even when car-radio sets are to be produced in a well-equipped factory by modern "quantity-production" methods innumerable difficulties are encountered; these difficulties are multiplied both numerically and quantitatively when the design is intended for the amateur.

The preceding paragraph is not intended as a "wet blanket," but it is better that the constructor should be aware of the troubles that he would encounter than that he should proceed in ignorance. In the latter case disappointment would result, whilst not a little money might have been spent to no good purpose.

## Exemplary Compactness

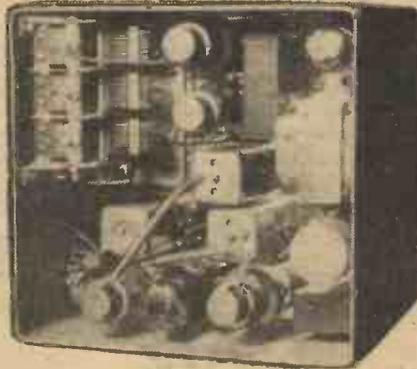
An average commercially-produced car-radio receiver has over-all measurements of about 8 in. by 7 in. by 6 in., or the dimensions give an approximately similar volume. If you take a piece of card and bend it to form two sides of an imaginary rectangular container of the size given you will at once be struck by the small amount of space in which the components must be mounted. Place within the space allowed the smallest loudspeaker on which you can lay your hands, and then drop in a two-gang condenser (a three-gang unit is often a necessity in practice), and then stand five valves upright on the flat base. If you have been able to get all of those parts into the permissible volume you have not done badly. But now find space for a couple of I.F. transformers, two coils and an L.F. transformer—if you can!

If you make this simple experiment it will be clear that real midget components

your needs. It must be remembered that none of us is satisfied with indifferent reproduction now; we want quality at least closely approaching that given by the average domestic receiver. Also bear in mind that the car aerial can only be a comparatively inefficient affair at best, and that it will be badly screened during a large part of the time that the car is on the road.

## Make This Test

If you are not convinced that the difficulties are as bad as I have outlined, fit an

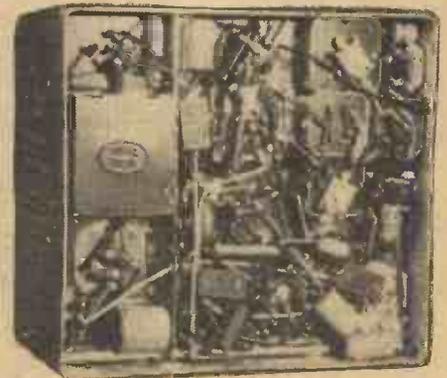


These two views show the compact construction of a modern commercially-made car-radio receiver. The set is a Masteradio.

aerial to the car—over the roof, under the running board or in V-shape under the chassis—connect it to the domestic set, which can be carried on the rear seat, and make a few simple tests. First, however,

Here Frank Preston A Home-constructed C Some of the Difficult Surmounted Before Can Be

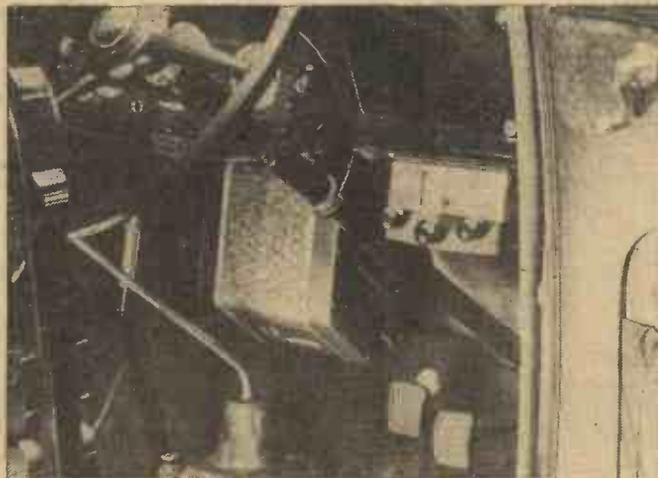
under a bridge, when the car is parked in a city street and when it is under some trees. This will give an idea of the extremely wide



range of A.V.C. which is required if reception is to be worth while. Incidentally, it is suggested that all these tests be made when the engine is switched off, since reception will be impossible at other times unless ignition suppressors are fitted. It will also be appreciated that the volume level needs to be at least twice as great when the car is being driven as when it is stationary if reproduction is to be heard comfortably above the noise of even a quietly-running car.

## It Can Be Done

If you make the tests which have been outlined, do not be discouraged into thinking that the whole business is just impossible. It is not—but it is well to be forewarned of the problems which have to be solved. There is no doubt that they can be solved,



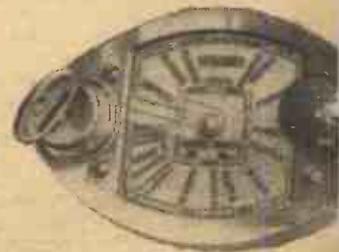
The Philco car-radio model M.522 is made in two units; controls are carried on the receiver unit.

are essential. Great difficulty will probably be found in buying many parts which are small enough, and it should be borne in mind that midget valves are practically out of the question, because very rigid I.H. valves are needed to withstand the vibration to which the set will be subjected, and for operation from the car battery—6 or 12 volt.

The argument might be raised: "Why not use a three- or four-valve straight circuit, and simplify the set in every possible manner?" The reply is that such a receiver will not generally prove adequate for

connect the earth terminal to a chassis bolt by means of a stout stranded cable. With the car outside the house and as clear of buildings as possible, tune in the local station. Set the volume control to about its midway position, and then drive the car into the garage. Again switch on the set, without altering the controls and note the change in signal strength; unless the receiver has an efficient A.V.C. system even the local transmitter will probably be almost inaudible.

Next go out in the car and make tests of signal strength on the open road, when



# RECEIVER PROBLEMS

## Analyses the Question of Car-radio and Sets Out Features Which Have to be a Satisfactory Answer Reached

for this is fully proved by the excellent results to be obtained from most of the ready-made car-radio receivers on the market. They have also been solved by several constructor-experimenters, but in most cases it has been necessary to dispose of them in turn by a meticulous process of elimination. Not only is it possible to ensure such good A.V.C. action that signal strength does not vary to a very marked degree in the circumstances of the tests above suggested, but it is possible to obtain interference-free reception by the use of a minimum of suppressors on the car.

When using almost any commercial car-radio set it is necessary to fit only a resistor suppressor in the main H.T. lead to the ignition distributor and a condenser across the contact-breaker. This result is achieved by the liberal use of small rejector inductances in the leads within the set; they are mainly in the power-supply circuits. Nevertheless, many readers might wish to fit suppressors in the sparking-plug leads as well, for the ignition equipment of any car can cause interference with short-wave and television receivers. That particular matter is, however, beside the point of this article.

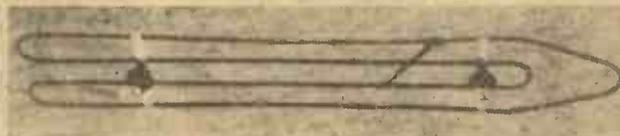
So far I am afraid that my criticisms have been more destructive than constructive. Let us look at the other side of

the picture. Given a five-valve superhet—preferably with pre-frequency-changer H.F. stage—it is possible to obtain excellent reception and to have a sufficient measure of A.V.C. High-tension can be obtained from a self-rectifying vibrator unit, which is not very expensive and is fairly compact. Low-tension supply may be drawn directly from the car battery if 6.3-volt or 13-volt valves are used, according to the voltage of the car battery; and these indirectly-heated valves have a high efficiency. If the best possible aerial system is employed, signal pick-up is satisfactorily good, but it is desirable to use single-screened co-axial cable for the lead-in. Ordinary screened cable has far too high a self-capacity, even in a four- or five-foot length, and will "waste" a large percentage of the pick-up. An under-running-board aerial is more effective than

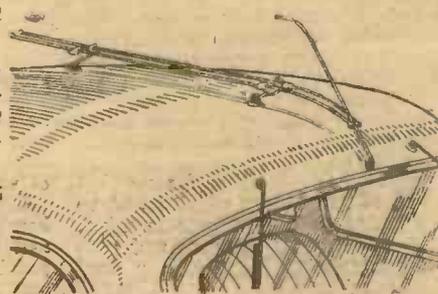
will probably be necessary to have the controls placed directly on the receiver; if this is mounted under the dash on the offside, the controls will not usually be very difficult of access. The second unit can be on the other side, and the two units can be joined together by means of ordinary screened twin leads, the screening of which should be earth bonded. There is another possibility by using this form of construction, which is that the vibrator-type power unit can be replaced by an H.T. battery if desired; in that case the battery-speaker unit could be placed almost anywhere in the car, since long leads would not present any great difficulty. Unfortunately, the average constructor will not take easily to the idea of using a dry battery when it is possible to dispense with it.

### Manufacturers, Please!

Push-button tuning is in many respects more logical for a car receiver, since the driver must not look away from the road to the tuning control. The constructor is up against the snag in this respect that—as far as I am aware—there is not on the market



Three types of aerial: fishing-rod (extensible), under running board, and roof-type.



is often supposed, while a V mounted between the gearbox and the two ends of the rear axle can be used satisfactorily. Additionally, there is the fishing-rod type of aerial, which is nearly as good as the roof type and has the advantage of being almost omni-directional.

### Unit Construction

The question of space is not an easy one, for there is insufficient space for a box very much larger than the dimensions given above in the average car of medium size. Until there are better available supplies of midget components the constructor could not build a set into the space allowed. But it is possible to compromise by making the set itself in one container—which must be of metal to give ample screening to the set—and by putting the power-supply unit and loudspeaker in another similar container. It might be possible to place these under the dash-board, one on each side of the centre.

### Controls

Remote control through flexible cables is out of the question except for the more ingenious and skilful constructor who can make these things. Consequently, it

a sufficiently small mechanically-operated push-button tuning condenser. If there were one of the cam-operated pattern many of our troubles would be overcome at once. Will any manufacturer take the hint? or will makers say that the demand would not justify the production? In this respect they should bear in mind that home construction is still very active, and constructors as keen as ever. They should also appreciate that the condenser would be used for domestic as well as car-radio receivers—and it would be a very popular component.

Well, that is the position as I see it, and I am not speaking without experience of the building of car-radio receivers and the extended use and test of various commercial models, the designers of which merit high praise. Readers will probably wish to give their views and to make practical suggestions; in the meantime they can rest assured that the Technical Staff of PRACTICAL AND AMATEUR WIRELESS is fully alive to their wishes and is constantly making experiments that might lead to the creation of a real home-constructor car-radio. But the Editor would not agree to the publication of a design that had not been proved, and which could not be successfully followed by a large percentage of readers.

In this Ferranti receiver the speaker is in a separate unit.



# AN INTERESTING CONVERSION

This Article Describes How an Old Writing Bureau was Cheaply Converted into a Useful Apparatus Desk

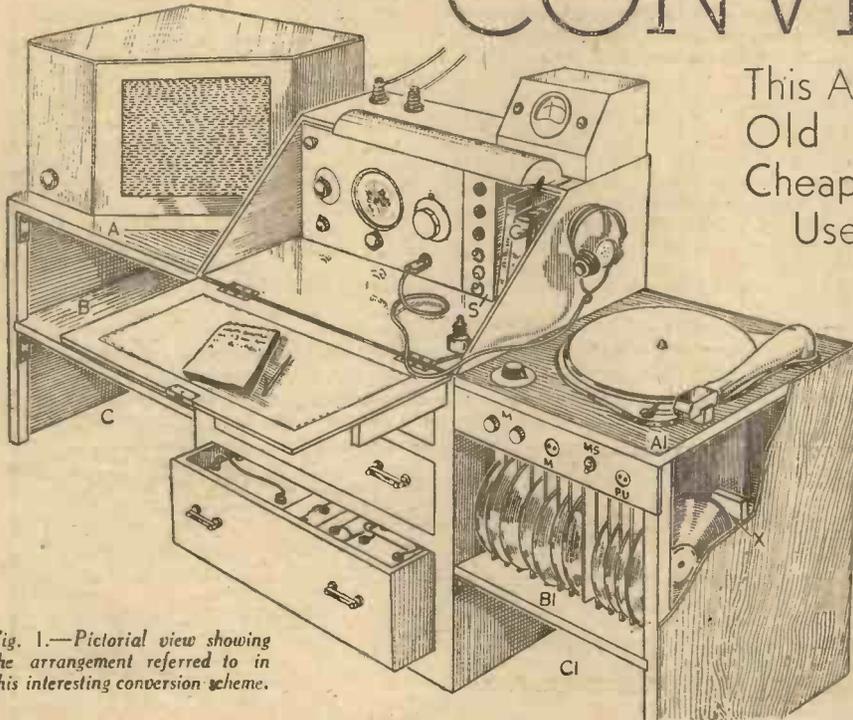


Fig. 1.—Pictorial view showing the arrangement referred to in this interesting conversion scheme.

THE attraction of a very reasonably priced bureau in a second-hand dealer's shop prompted the writer to carry out the conversion pictorially illustrated in Fig. 1.

The style of the desk, although somewhat antiquated, followed lines which could be readily adapted to the purpose in mind, and after weighing up the pros and cons of various apparatus layouts, the final choice was quite simple, providing, as depicted, a well-balanced appearance with the controls conveniently positioned for ease of access when sitting at the desk. A summary of the different equipment and the various functions will show the merits of the system adopted.

## Housing the S.W. Receiver

On examination it was found that whilst the existing short-wave receiver chassis could be comfortably fitted in part of the space provided by removal of the pigeon-hole partitions, the front panel unfortunately just fouled the edge, preventing the desk lid from closing. It was, however, a simple matter to cut down the panel width by half an inch or so, the receiver now being able to slide snugly in place as shown in the illustration, and occupying just over half the width of the desk.

To the right of the receiver is accommodated the battery switching and pilot light panels for controlling the supplies to the receiver; an L.F. amplifier of modest design housed in section "B" (Fig. 2), and the distant-speaker switching, or remote control relay board, is positioned in section "C."

The remainder of the space obtained by removing the partitions is devoted to essential log and reference books only, the first drawer being utilised for miscellaneous

radio cuttings and data sheets, whilst the second drawer contains a collection of interesting blue prints and diagrams, thus making another step in that very desirable direction from the experimenter's point of view—orderliness.

Gramophone reproduction is always to hand, whilst for microphone experiments and home play purposes, a simple mixer panel is included in this part of the framework, relaying to downstairs rooms being carried out through the medium of button-controlled relays in the remote control system.

## Record Cabinet

A small selection of the most useful records for both test and amusement is filed under the gramophone turntable in section "B1," each record being separated by plywood partitions thoroughly sanded down and coated with varnish to a smooth and glossy finish, thus giving a cheap but reasonable degree of protection to the records when constantly sliding these in and out.

The bottom drawer of the desk is considerably deeper, and good use was made of this by allocating it to the dry batteries for the short-waver and the remote control scheme.

A commercial broadcast receiver covering the medium and long-wave bands only is used separately, thus the whole of the desk conversion could be given to the experimental side. It was realised, however, that a separate cone type, or perhaps this should be designated as a moving-iron type, speaker would be a desirable consideration from the short-wave aspect, and the "A" section was kept free for a cabinet speaker of this sort.

Reproduction from the L.F. amplifier can be relayed by the broadcast receiver speaker through the medium of a switch, this switching arrangement also taking into consideration the reproduction of strong signals of entertainment value from the short-wave receiver.

Wave-change switching in the short-waver is carried out by the rotary coil unit principle, thus overcoming the difficulty arising normally in housing the chassis in this manner and so preventing access to the coils when of the plug-in type.

## Illumination

A "strip" illuminator was constructed out of aluminium, and fitted to the top of the desk, and although only three 4-volt bulbs are used, supplied from a spare secondary of a mains transformer, this provides quite satisfactory lighting.

(Continued on facing page)

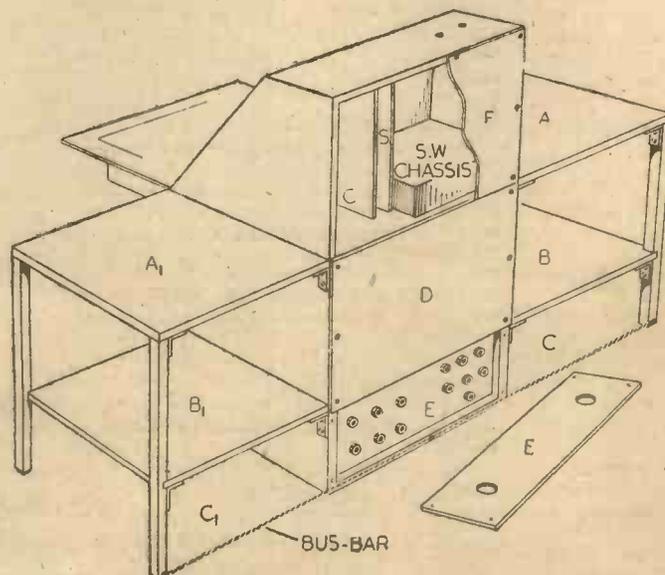


Fig. 2.—Rear view of the completed desk, showing compartments for the receiver, amplifier, reference books, gramophone records and dry batteries, etc.

**AN INTERESTING CONVERSION**  
(Continued from facing page)

The transformer in question was fitted on the baseboard of an existing H.T. battery eliminator housed in section C1, and used for a variety of test circuits, but as in the case of the L.F. amplifier leads, and the gramophone motor supply leads, screened cabling was essential, in view of the proximity to the short-wave receiver. To ensure adequate earth return for all the immediate apparatus, it was deemed advisable to use the bus-bar system, and to this end a length of 7-21 bare tinned-copper wire was run along the whole length of the framework as shown in Fig. 2, the incidental earth connections being tapped off this in the conventional manner.

**Woodwork Extensions**

With regard to the woodwork: This proved not so difficult as anticipated, primarily owing to the clean framework and simple lines decided upon. The extension framework consists of 3/4 in. plywood "trays" bracketed with soft iron angle-brackets secured to 2in. by 2in. supports and the sides of the desk.

Oak ply was used finally for the backs and sides, the desk back-pieces being provided in three sections for access to the desk equipment.

As mentioned, the gramophone record partitions were cut from thin oak ply; these partitions had to be recessed in chiselled grooves made in the "B1" shelf, and underside of the "A1" shelf, finally gluing when bracketing down this part of the assembly.

Through the centre of all the record partitions is passed a length of American white wood (X, Fig. 1), this being fitted by a bracket to the side of the desk, and by screws to the plywood side.

The object of this centre strip is to keep the records protruding, as the depth of the section would result in them rolling to the back and becoming inaccessible, and although narrower partitions could be used with the records resting against the back of the section, this method would not prove so convenient, for obvious reasons.

It will be seen in Fig. 2 that the back of the bottom drawer is used as a socket panel, by this means the drawer can easily be removed with the essential battery wiring intact and without disturbing the apparatus wiring.

Finally, to improve the appearance of the job, two coats of oak varnish (oil varnish) were given to the extension woodwork, then the old drawer handles were replaced by smart, straight-pattern ones obtained from a well-known stores.

# WHAT IS A TETRODE?

The Characteristics of this Useful Addition to the Range of Modern Valves are Briefly Explained in this Article by PERCY RAY

**T**HE tetrode is undoubtedly a useful contribution to the range of valve types available, but it is, after all, a modified pentode, and it is doubtful if its advantages and limitations are really understood by the average constructor; furthermore, there is a surprising amount of confusion over the word "tetrode" in the minds of those people who follow the science in a casual way.

The word "tetrode" unquestionably means four electrodes, and, therefore, must include the screen-grid H.F. valve, the four electrode intermediate L.F. amplifier (a type more or less unknown in this country), the bi-grid valve used some ten years ago as a mixer in superheterodynes, the space charge valve—which was a triode with an extra grid positively charged to enable it to work on an H.T. voltage of 10 volts or so—and the modern output valve. Although the derivation of the word "tetrode" must include the types mentioned above, in practice it is intended to convey two types only—the ordinary screen-grid H.F. amplifier, and the modern output tetrode. It is curious that a valve should date back so far, fall into disuse, and then reappear for a purpose so utterly different from that which it originally served.

**The Screen-grid Valve**

The H.F. tetrode, or as it is colloquially called, the screen-grid valve, was introduced because of the shortcomings of the triode, and when news of its existence became generally known, it was thought to be a valve that would cure all existing ills. Its greatest snag, however, was the nasty dip in its characteristic curve which made it impossible for the valve to handle any considerable H.F. swing, and in the fullness of time, therefore, the additional grid was introduced between the screening-grid and the anode, which effectively prevented secondary emissions from the anode from passing to the screen, the cause of the dip in its characteristic curve, and the H.F. pentode came into existence. The tetrode then passed into disuse.

Comparatively recently an effort was made to get rid of the extra grid in the output pentode, as the presence of this grid brought about

two undesirable features. Firstly, the close proximity of the extra grid to the anode resulted in relatively high anode to cathode capacity, which tends to clip very high notes, and secondly, the somewhat high impedance of the valve, which tended to produce a certain amount of bass resonance. The removal of this additional grid would, therefore, produce a valve with certain desirable characteristics, but it was known that an output tetrode as a pentode would be, without the third grid, at the disadvantage of non-linearity referred to earlier in this article. It was found, however, that by suitably designing the tetrode, and providing the anode with projections, and placing the latter at a safe distance from the other electrodes, a tetrode of sensibly linear characteristics could be produced. The large spacing between the anode and nearest electrode is important, resulting in lower capacity between anode and all other electrodes, as already described.

**Third Harmonic Distortion**

Tetrodes may be considered as similar to equivalent pentodes, inasmuch as their order of sensitivity is the same, the anode load similar, and the H.T. consumption and grid-bias in many cases identical. These facts make tetrodes and pentodes interchangeable, and permit of direct comparison by the experimenter. Like the pentode, the tetrode is troubled more with third harmonic than second harmonic, and when used with the correct anode load the second harmonic distortion is sensibly absent in some types now available, whereas neither has any great advantage over the other from the point of view of third harmonic distortion, although the tetrode is more tolerant towards an incorrect load than the average pentode.

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12 MONTHS GUARANTEE INCLUDES VALVES



# Practical Television

June 24th, 1939. Vol. 4. No. 157.

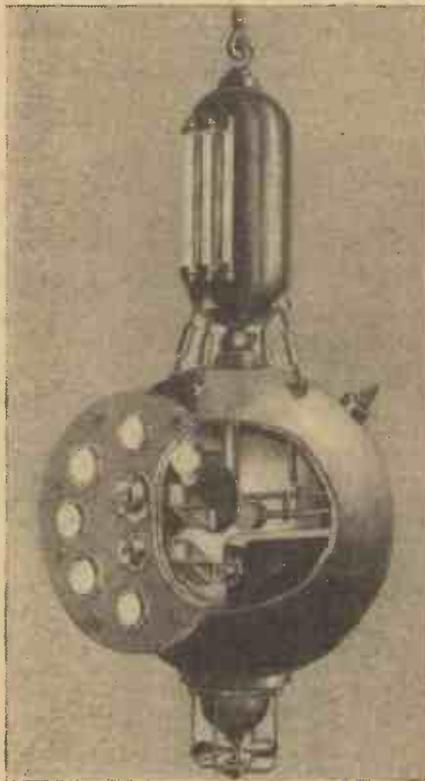
## Following British Methods

WHEN the service of high-definition television started in this country two and a half years ago, at every exhibition where receivers were shown in operation crowds of unprecedented size had to be handled. Everyone was anxious to see what results could be achieved through the medium of this newest of inventions, and in spite of the relatively poor quality of the programme material the comments on the results were most flattering. The latest news from America shows that exactly the same sort of thing is happening in that country. At the World's Fair in Flushing Meadows, and at all the show rooms, people flock in hundreds at all hours of the day to see television pictures. Press stories have explained beforehand in simple language how the systems work, but this is the first opportunity given to the American to see the results. The quality of reproduction is inferior to that now enjoyed in this country, but although set prices are fixed at a high level, strenuous efforts are being made to boost sales. The biggest problem that the industry is now brought face to face with, is how television can be adapted to their own sponsored programme system. Already opinions are being expressed that the British method of entertainment without advertising may be the best, after all, but it is doubtful whether the U.S. government will be prepared to finance such a scheme. In the meantime, however, the manufacturers are bearing the brunt of the costs on both the technical and programme sides because of the publicity furnished by the Fair, but before long these service problems will have to be settled on a commercial basis.

## Under-water Television

THE recent submarine tragedy where nearly a hundred men lost their lives in the ill-fated *Thetis*, has served to bring to light once more the suggestions made some years ago by a continental inventor named Hartman for using television transmission equipment under water. This idea was put forward when low-definition disc scanning apparatus was the only satisfactory method then available for producing television pictures, but with the modern electron camera in one of the many forms now developed to such an advanced stage, it may not be too much to hope that the scheme may be resuscitated with a greater chance of success. As far as the original suggestion was concerned, the accompanying photograph gives a good idea of what was in the mind of the inventor. A thick walled spherical metal container was used to accommodate the transmitting scanner, here shown as a disc and photo-electric cell. Self-contained lighting provided sufficient illumination for picture signals to be generated of the scene within the compass of the lenses used with the apparatus. After amplification, these signals were fed to a monitor receiver accommodated in a boat connected by cable to the underwater scanner. Small propellers enabled the apparatus to be raised or

lowered so that a satisfactory exploration of the underwater scene could be effected. Assuming now that the simple mechanical scanning device could be replaced by a sensitive television camera remotely controlled from the ship above, there is no reason why such apparatus could not be rushed to any point where underwater observations may be the means of saving life. The same apparatus could, of course, be used to provide pictures of the ocean



An early suggestion for an under-water television camera.

bed where a scientific investigation of water life was being carried out.

## Television and the Telephone Cable

IT was made known recently that the engineering staff of the National Broadcasting Co. of America have been carrying out a series of experiments for the relaying of television signals over an ordinary telephone line, instead of using a coaxial cable. The tests were carried out over a distance of one mile in connection with a special outside transmission, and the results were stated to be quite satisfactory, due to the employment of special amplifiers. This work has been undertaken because of the high cost of coaxial cable—£1,000 per mile—but the Americans seem to have lost sight of the fact that quite regularly in this country the B.B.C. have made recourse to telephone lines for relaying television

signals from points outside the coaxial ring which is laid round London. Sir Noel Ashbridge recently drew attention to the extension of range provided by the use of ordinary Post Office telephone cables. As a result of a very careful equalisation of the frequency characteristics, telephone cables, in pairs, can be employed most successfully for handling vision signals up to distances of the order of four miles. Under these circumstances it is essential to employ specially-designed terminal equipment, and two intermediate line repeaters with equalisers installed at Post Office exchanges along the route. The lines themselves, however, are in no way interfered with, and it was made known over a year ago that distribution schemes of a similar character were being developed in Germany for use within the Berlin area.

## Televising Boxing in America

IT is generally conceded that the event which marked a milestone in big screen presentation was the televising of the Boon-Danahar boxing match in February. It signalled the rediffusion of pictures to cinemas on a big scale, and the portrayal on large screens of a size never attempted before. Now the news has come through from America that a Baird big-screen projection receiver was erected in a cinema for private exhibition, and the whole of the Baer-Nova fight was shown to an enthusiastic audience. The results seen were claimed to be as clear as those observed in this country, and represent a British engineering triumph of no mean magnitude. American experts are amazed at the clarity of the pictures, and it is certain that both home and cinema television will develop together in that country instead of the former having a substantial lead as was the case in England due to the early start of the B.B.C. service for home-viewing.

## Seeking Co-operation

MR. COCK, the B.B.C. Director of Television has now returned from his visit to America, and one result of his trip is said to be the establishment of a basis whereby ideas for television programmes and scripts would be exchanged with America. He has gone a long way towards removing the antagonism shown by the film industry to television's development in that country. As far as the B.B.C. service is concerned it is now suggested that a film half-hour may be introduced, the object being to deal with film releases by showing special trailers which portray the high-lights in the films themselves. This idea is certainly an admirable one and was put forward as a constructive suggestion in these columns several months ago as a contribution to a way out of the impasse then existing between film and television interests. The occasional revival of a big classic would also do no harm, especially while the members who regularly look in at home are only a fraction of the total who pay a weekly visit to the local cinema for their entertainment. A little give-and-take on both sides would remove immediately the misunderstanding which seems to exist, and to the ordinary individual there seems no reason why the differences could not be settled at a single round-table conference.

### PATENTS AND TRADE MARKS

Any of our readers requiring information and advice respecting Patents, Trade Marks or Designs, should apply to Messrs. Rayner & Co., Patent Agents, of Bank Chambers, 29, Southampton Buildings, London, W.C.2, who will give free advice to readers mentioning this paper.

# RADIO CLUBS & SOCIETIES

Club Reports should not exceed 200 words in length and should be received First Post each Monday morning for publication in the following week's issue.

Special Notice: Will club secretaries please send in reports in the form they appear on this page.

**DOLLIS HILL RADIO COMMUNICATION SOCIETY**  
Hon. Sec.: E. Eldridge, 79, Oxgate Gardens, Cricklewood, N.W.2.

It has been decided that the meeting of June 20th will be the last for this season. Meetings will be resumed in September. In addition to the planned 5-metre D.F. meeting, the society will install, during July, a transmitter operating portable with G6SKP, and it is hoped to contact other stations on 14 mc/s with telephony and C.W. Members who wish to take part in these events are reminded that they can now only obtain details from the sec.—by letter or telephone G1A 2315. G6OV, G6SK and G6GK will also be in a position to advise members. Some good things are likely to follow the events above, and members who would be interested are asked to advise the secretary of their willingness to participate.

**SLOUGH AND DISTRICT SHORT-WAVE CLUB**  
Headquarters: 35, High Street, Slough, Bucks.  
Secretary: Mr. K. A. Sly (2FAU), 16, Buckland Avenue, Slough.  
Meetings: Alternate Thursdays at 7.30 p.m.

On June 8th, an informal meeting was held at 184, Stoke Poges Lane, Slough, the QRA of 2DDG. We were very pleased to welcome several visitors, among whom were G3FJ and 2FWG. All present spent a very pleasant evening.

The next meeting will be held at Headquarters on June 22nd, when the agenda will include a talk by Mr. Houchin (G3GZ) on radio transmission in the early days.

New members are always welcome at any meeting, where they will find much of interest to all radio enthusiasts.

The annual subscription is 2s. 6d., and an extra 3d. a each meeting for the hire of the clubroom.

**SALE AND DISTRICT RADIO SOCIETY**  
Headquarters: St. Mary's Schools, Barkers Lane, Sale, near Manchester.  
Meetings: Weekly, on Thursdays, at 7.30 p.m.  
Secretary: S. C. O. Allen (2FCQ), 31, Emerald Drive, Ashton-on-Mersey, Sale.

In place of the usual lecture the last meeting of the society was devoted to a general discussion of the theory of alternating and direct currents, as affecting radio transmission and reception, speakers illustrating their remarks by a large number of graphs and diagrams. There was also some time devoted to consideration of crystal controlled and self-excited amateur transmitters. Morse tuition was given.

Two new members were enrolled and the society will be glad to welcome any readers of this magazine who are interested in short-wave reception and transmission. There is an entrance fee of 1s., and subscriptions are 6d. per week. The callbook and "Jones Radio Handbook" have been purchased.

**THE SURREY RADIO CONTACT CLUB, CROYDON**  
Club H.Q.: 79, George Street, Croydon, Surrey.  
Hon. Sec.: S. A. Morley, 22, Old Farleigh Road, Selsdon, Surrey.

The club took part in the annual 1.7 mc/s N.F.D. event during the first week-end in June under the call G2FIP. The first day was mainly taken up with

the erection of the antenna and the setting up of tents and apparatus, etc. As zero hour approached excitement became tense, then the time came to commence: the first few hours were devoid of much excitement until about ten o'clock when things began to warm up somewhat and a great number of contacts were made during the night. About 3 a.m. tea was served, but, unfortunately, the maker in question mistook the paraffin for water with the result that several felt very uncomfortable a few hours later. The second day proceeded very well, although conditions seemed to fall off somewhat, but in spite of this quite a few contacts were made. Everyone expressed at the end of the day what an enjoyable week-end they had spent.

The club meeting the following Tuesday consisted of short talks by operators on their experiences and the apparatus used. In conclusion 2CRD gave a short talk on the humorous events of the preceding week-end.

**ASHTON-UNDER-LYNE AND DISTRICT AMATEUR RADIO SOCIETY**

Headquarters: Commercial Hotel, 86, Old Street, Ashton-under-Lyne.  
Secretary: K. Gooding (G3PM), 7, Broadbent Avenue, Ashton-under-Lyne, Lancs.

A recent meeting it was unanimously resolved in future to charge an entrance fee of 2s. 6d. A new clubroom has been obtained, and fatigue parties are very busy getting things shipshape. It is hoped to install gear very shortly and to apply for a transmitting licence.

On June 25th there will be a try-out of the society's 56mc/s TX provided by G3BY. Operating with the latter, call tests will be carried out from Hartshead Pike located at a height of 900ft. above sea-level in the Pennines. The frequency will be 59,212 kc/s, and the antenna, consisting of two half-waves in phase, will be tried in various directions and planes. The station will be operating between 09.00 and 18.30 G.M.T., and co-operation from other 56 mc/s enthusiasts is invited.

**COXHOE AND DISTRICT AMATEUR RADIO SOCIETY**

Secretaries: R. Bowes (2DTA), 10, Blackgate, Coxhoe, Co. Durham.  
D. F. Chant, 23, North View, Sherburn Hill, Co. Durham.  
Meetings: Temporarily; fortnightly, alternately on Mondays and Tuesdays.

A MEETING was held at the temporary H.Q., Slake Terrace Inn, West Cornforth, at 7.30, Tuesday, June 6th.

Owing to the absence, through illness, of Mr. Ayton, the Morse instructor, Morse practice for beginners was carried out by Messrs. Chant and Bowes. The society's receiver, which is to be a 0-v-1 (pentodes) and mains driven, was started, under construction by members with the help of Mr. Bates. The power pack will be constructed by other members when a more definite programme is arranged. We would still welcome further support and further details may be obtained from the secretaries.

**BRITISH SOUND RECORDING ASSOCIATION**

Hon. General Sec.: F. J. Chinn, 14, Trillemont Road, South Croydon.

A MEMBERS' equipment evening was held at the London meeting room, off the Strand, on Friday, June 9th. For this meeting each visitor contributed an item of recording and/or reproducing equipment, which he described and demonstrated to the assembly.

A recording and play-back amplifier with loud-speaker was supplied by Mr. D. Davidson, in addition to a moving-coil microphone. Mr. L. Widger, Research Engineer of the National Institute for the Blind and St. Dunstan's, brought along two portable reproducers (one electric and the other an acoustic model with stethoscopic earpieces) for recording the 24 r.p.m. "Talking Books for the Blind" records. Outstanding exhibits amongst the other apparatus were a ribbon microphone constructed by Mr. C. Appleby; a special Presto recording by Mr. D. Aldous of an American sponsored broadcast; a combined ribbon-condenser microphone by Mr. D. Roe, and a novel design of tracking mechanism by Mr. J. Hale.

It was unanimously agreed by all present that this type of meeting was both entertaining and instructive.

## ELECTRADIX

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NET

# TELEVIEWS

## The Derby in Retrospect

Now that the natural excitement associated with the televising of the Derby is over it is opportune to examine the results in a dispassionate manner. Not only were the results watched by an estimated audience of 100,000 on home receivers, but there were five demonstrations of big screen equipment. In the case of the E.M.I. company, a private view of their new projection type cathode-ray tube apparatus was given in their Hayes laboratories. This equipment, built in compact form, gave a front projection picture, the receiver being situated about 40ft. in front of the screen and using a 14in. wide aperture lens. The anode volts employed were of the order of 50,000 and the picture, about 5in. wide, built up on the fluorescent screen, was projected right through the tube's screen on to the remote silver screen; electrode assembly, screen face and lens being aligned on the same axis. The results seen on a screen 15ft. by 12ft. were good, but the cinema industry is reserving its final judgment until it is seen operating in a modern cinema under normal conditions. The Scopphony mechanical system was seen in the Odeon Cinema, Leicester Square, the picture being back projected on to a somewhat directional screen slightly less than 15ft. wide. The results showed an improvement on the 6ft. by 5ft. picture which had been used for all previous demonstrations. Three cinemas featured the Baird equipment, for in addition to the Tatler and Marble Arch Pavilion, the New Victoria had an entirely new receiver installed. In each of the three cinemas, however, the latest form of projection tube, giving a material increase in brightness and employing fluorescent screens from which the picture is projected straight on to the remote screen, was used. The reaction of the cinema audience to the transmission gave evidence of their satisfaction, but in one or two points the B.B.C. made mistakes. In the case of the sound commentary, it was wrong to give both the television and ordinary broadcasts on the vision sound channel, for this caused repetition—the horse numbering was heard two or three times—while some of the remarks contradicted one another. Then again, in the long-shot of the start of the race, when a 20in. telephoto lens was employed, the picture was exceedingly poor and had a double image which spoilt the whole effect. It was kept on far too long and emphasised how great an improvement could have been effected if the two O.B. units had been in commission, one at the start and one at the finish of the race. To attempt to cover the whole of the race from one camera position was too ambitious, but apart from the extreme long shots the pictures were of good quality and the exciting atmosphere of the whole event nullified very materially any technical imperfections.

## Not in Agreement

WHILE on the subject of big screen television, it is interesting to note that certain sections of the cinema industry are not in complete agreement as to their attitude towards the development which so vitally affects their whole trade for the future. This was made abundantly clear when the C.E.A. and K.R.S. saw the

Postmaster-General recently in order to present their case to him. The P.M.G. asked the deputation to present him with a memoranda of their case, and although, at first, it was thought that there would be a joint trade opposition to the re-diffusion of television to cinemas, the reports of subsequent conferences indicate that there is a cleavage of opinion. It is said that the C.E.A. want the K.R.S. to ban the televising of films, but at the same time they are prepared to encourage the introduction of large screens into cinemas for the portrayal of outstanding news events. It will be recalled, however, that both Odeon and Gaumont British, who are prominent members, are making a big effort to equip cinemas as fast as possible. There is no doubt that the industry is unanimous on one point, however, and that is a measure of protection against exorbitant charges being made by the promoters of those events which lend themselves so admirably to rediffusion. Lord Cadman's television report to the P.M.G., which is expected shortly, is said to recommend that the entire control of television, including the fees to be paid by cinemas, shall remain vested in the B.B.C. It is also expected to state that the price to be paid for a televised event shall not be dictated by the promoter, and that there shall be no monopoly given to one particular circuit to the detriment of another. There is no doubt that these



Television's first baseball game, forecasting the day when a million American fans from coast to coast will cheer lightning-fast double plays at their own fireside, was seen recently (May 17th) over the National Broadcasting Company's Station W2XBS, New York. Princeton and Columbia Universities battled ten innings at Baker Field before the deadlock was broken.

equality of rights and regularising of fees will do much to remove the uncertainty which has hitherto existed in the trade.

## Output Intensification

CONTINUED efforts are being made to intensify the output provided by a cathode-ray tube used for television reception, and one of the most recent proposals is that the tube should become a form of relay. For this purpose a double screen would be employed, this being built up

from a group of quartz rods arranged side by side and held together by a suitable binding material. At one end provided by the rod faces, a coating of fluorescent material would be applied, and at the other a light-sensitive material so that the combined effect is a mosaic screen. In use the light image produced on the fluorescent face by the impact of the modulated electron beam would be conveyed to the mosaic cells simply by internal reflection inside the individual quartz rods. In this way it is claimed that the usual dispersion losses would be reduced very considerably.

## A Constructive Suggestion

THE financial and copyright problems associated with the rediffusion of television pictures to those cinemas having big screen apparatus installed are at the moment fairly considerable and have proved the subject of considerable discussion among the various trade interests involved. In an attempt to solve these on an equitable basis a definite proposal has now been put forward to the B.B.C. by Mr. Deutsch of the Odeon Company. On rather broad lines it is to the effect that the B.B.C. itself should undertake all the negotiations which are involved. This would mean that first of all the promoters of any event to be televised should be paid a comprehensive and adequate fee which would cover not only the ordinary broadcast rights but also rediffusion to cinemas. When this has been settled the B.B.C. would then make a charge to each cinema desiring to show the pictures to their patrons, and as the number of cinemas scheduled to have

equipment installed is rising, it is anticipated that there would be sufficient profit to the Corporation to enable them to devote the surplus towards making improvements in their O.B. equipment. There seems little doubt that an arrangement of this nature would be preferable to the one now in existence where the rediffusion rights and copyright are vested in two separate authorities. How far this will go towards bringing about a satisfactory solution only time will tell.

# Remote-control Tuning

An Arrangement for the Remote Control or Push-button Control of an Adjusting Device, Particularly of the Tuning Device of a High-frequency Set

**A**RRANGEMENTS are already known for the remote control or push-button control of the tuning device of a receiving set with respect to one or several pre-determined positions. In this known arrangement a switch corresponding with the pre-determined position is connected in series with a sliding contact moving on a surface consisting of two parts for right-hand and left-hand rotation, with the winding of the motor coupled to the tuning device and with a current supply.

The principle of this arrangement is shown in Fig. 1. The contact surface consists of the two part surfaces  $F_1$  and  $F_2$  firmly connected with each other but provided with a break, and the sliding contact  $K$  slides on this contact surface. The switch  $S$  provided at the control point and a D.C. potential supply  $Q$  are connected in series with the sliding contact. The free

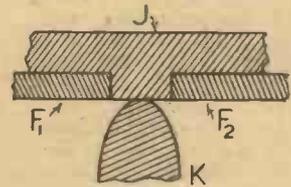


Fig. 2.—Details of the break and contacts.

pole of the potential supply is connected through the winding  $W_1$  of a motor with the contact surface  $F_1$  and through the winding  $W_2$  of the same motor with the contact surface  $F_2$ . The windings are arranged within the motor so that when current passes through one winding the motor rotates in right-hand direction, and when current passes through the other winding the motor rotates in left-hand direction. The motor is coupled with the device to be adjusted, for instance with the tuning condenser of the receiving set to be remote-controlled, as well as with the contact surface consisting of two parts. When the switch  $S$  is closed the break of the contact surface moves in the direction towards the sliding contact shown at  $K$ . Having reached the break, the current is interrupted and the motor and tuning

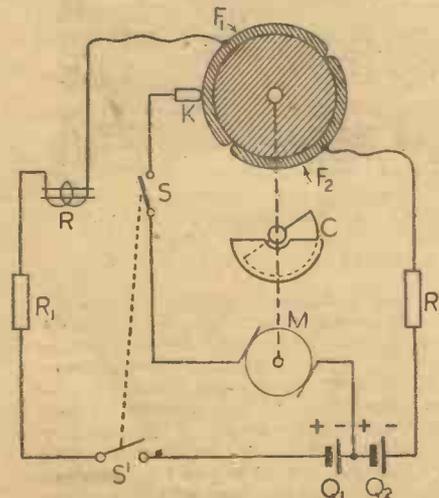


Fig. 5.—A remote-control system using a motor with a single winding.

condenser come to rest. The two surfaces are designed in the known arrangement in the form of half rings arranged on a rotating cylinder.

### Constructional Details

The details of the construction of the break in this known arrangement is shown

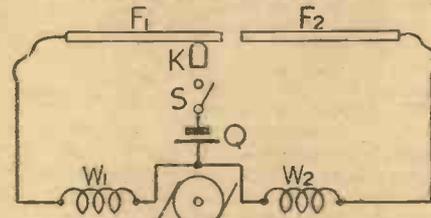


Fig. 1.—Diagram illustrating the principle of a remote-control push-button system of tuning.

in Fig. 2, which describes the arrangement in a run-in condition in which the contact  $K$  is at the break. The ends of the two contact surfaces  $F_1$  and  $F_2$  are kept together by an insulation piece  $J$ , which also fills the break itself. The effective width of the sliding contacts in this arrangement must be considerably smaller than the width of the break, if hunting is to be avoided, whereby the accuracy of adjustment

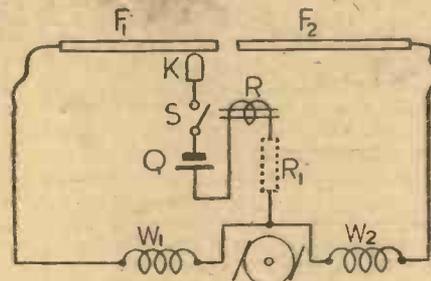
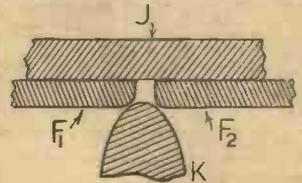


Fig. 3.—A similar arrangement to that shown in Fig. 1, but with the addition of a relay and limiting resistance.

becomes limited. The width of the range of possible positions in which the motor is without current and the arrangement can therefore remain at rest, is equal to the difference of the width of the break and the effective width of the sliding contact. It is in this case not possible to make the width of the contact even by a very small amount smaller than the width of the break, as in such case, apart from errors in manufacture, owing to the fly-wheel mass of the whole device the contact would continue to move after leaving the surface  $F_1$  until it makes contact with the surface  $F_2$ , whereby its direction would be reversed, resulting in a continuous pendulum movement. In accordance with the

present suggestion, for the purpose of increasing the accuracy of adjustment, the sliding contact and the break between the two parts of the contact surface are so designed that when the sliding contact reaches the desired position it is in electric connection with both halves of the contact surface. At the same time a relay device or a time-switch are provided which compulsorily interrupt the current when the desired position has been reached, or shortly afterwards. In particular, the contact surface should have a groove at the break, and the point of the sliding contact should be so radiused that practically only in a single position of the contact surface with respect to the sliding contact this is in electric connection with both halves of the contact surface. The advantage of the idea consists in the fact that the end position at which the motor

Fig. 4.—Details of the break used in the arrangement shown in Fig. 3.



comes to rest is defined considerably clearer than with the existing arrangements, so that a very accurate adjustment is possible. In the moment of time when the adjustment has been reached, a very intense current is taken from the current supply, which is, however, soon interrupted by the relay device or the relay switch so that no permanent harmful short-circuit current can occur.

One way of carrying out the idea is shown in Figs. 3 and 4. The circuit of Fig. 3 as compared with that of Fig. 1 is different in so far that a relay is provided between the potential supply  $Q$  and the connection point of the two motor windings  $W_1$  and  $W_2$ . This acts upon the switch  $S$  in such a sense that it opens the closed switch through the relay winding exceeds considerably the value existing during the adjustment. When the adjustment has been

(Continued overleaf.)

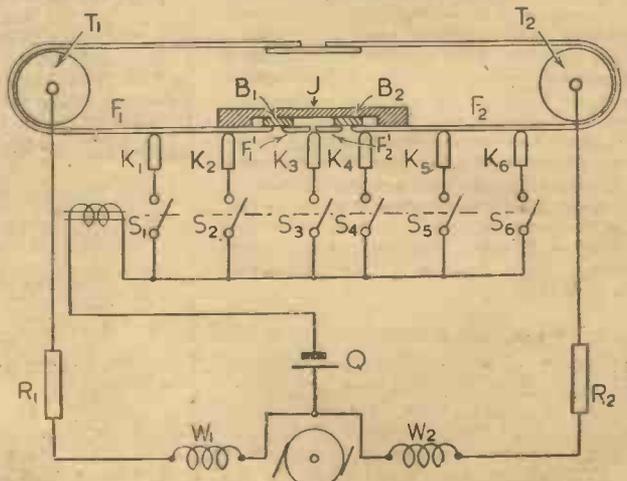


Fig. 6.—Showing the arrangement of contact surfaces to provide for a smoother swinging-in of the contact.

**REMOTE-CONTROL TUNING**

*(Continued from previous page)*

completed, the contact K makes contact with both contact surfaces  $F_1$  and  $F_2$ , as indicated in Fig. 4. The particular shape of the break results in contact with both surfaces being only possible in a certain position. In this position current flows through both windings  $W_1$  and  $W_2$  of the motor, so that the resulting torque on the motor is zero and the motor comes to rest. These currents will rapidly increase, as with standing motor the electro-motoric counter force is eliminated. The sum of the two currents flows through the relay

circuit current flows through the two surfaces, the relay winding R, the resistances  $R_1$  and  $R_2$ , the closed switch  $S^1$ , and the two potential supplies  $Q_1$  and  $Q_2$  connected in series. This short circuit current, which is much larger than the current during the adjustment, opens at the same time the contact S and the contact  $S^1$ , so that no permanent short-circuit current can flow. In order to avoid any loss of output, chokes may be connected instead of the ohmic resistances  $R_1$  and  $R_2$ .

It is furthermore possible to connect another switch  $S^2$  between  $Q_2$  and  $R_2$ , which is firmly coupled with the switch  $S^1$ .

In this case the relay has only to operate the switches  $S^1$  and  $S^2$ , and the switch S may remain in the switched-in position when the adjustment is completed.

In order to obtain a smoother swinging-in of the contact into its final position the contact surfaces may be so constructed that the part of the surfaces nearer the break are connected with the more remote parts through such resistances, the adjusting movement of the motor is reduced when the sliding contact approaches the break. A design of this kind is shown in Fig. 6: Two metal bands,  $F_1$  and  $F_2$ , running over drums  $T_1$  and  $T_2$ , and connected by insulating pieces to an endless band, are provided as contact surfaces. Near the break two short parts  $F_1'$  and  $F_2'$  are separated from the contact surfaces  $F_1$  and  $F_2$  and are connected with them only through strips  $B_1$  and  $B_2$  consisting of resistance material.

Motor-operated Relay

Under certain circumstances the separate relay arrangement may be replaced by the motor itself. An example of such an arrangement is given in Fig. 7 for a wireless receiver with push-button control. The arrangement of the contact surfaces and of the sliding contacts may be that of Fig. 6. The switch  $S_1$  is shown by the pin  $T_1$  of the push-button  $D_1$  as well as by the lug  $H_1$  fitted at the insulating plate P. The pin is taken through the metal plate B and presses with its point, when the push-button is pressed in, through a recess of the plate P on to the contact lug  $H_1$ . This connects the motor M whose rotor begins to rotate in a certain direction. As the rotor of the motor has no fixed bearings the stator attempts to rotate in opposite direction and pulls therefore the plate P through a cord N against the force of a spring F towards the left-hand side in such a way that the push-button  $D_1$  is maintained in its pressed-in position. This limits also the rotating movement of the stator. The rotor of the motor operates through a cable gear the disc E, whose spindle is coupled directly

with the spindles of the tuning condenser, which is not shown in the drawing. The knob G makes it possible to adjust by hand if required. The pointer Z is moved parallel to itself in front of the scale of the receiver.

As soon as the final position has been reached and the rotor comes to rest, the torque upon the stator ceases also and the blocking plate P is pulled back by the spring F into its position of rest in which the knob  $D_1$  is released back into its position of rest. The same plate may also be used for blocking further push buttons which belong to other stations to be tuned in and of which only one more, namely  $D_2$ , is shown in the drawing. Furthermore, a fuse may be provided in series with the potential supply and the motor winding which fuse may prevent a continuous short circuit current through the motor windings and thus the burning out of these windings if the unblocking arrangement should fail.

It is also possible to provide a separate two-part contact surface for each of the pre-determined positions, and an example is given in Fig. 8, with regard to a remote control arrangement for an aircraft transmitter. The circuit is in principle similar to the circuit according to Fig. 3, with the exception that several two-part contact surfaces are connected in parallel and that a corresponding number of series connections of sliding contacts and plug switches are also connected in parallel. In the common return lead to the potential supply lies a time switch S, which is so constructed that it is closed when one of the plug switches  $S_1, S_2$  is operated and which is automatically opened again after a certain lapse of time which is in any case sufficient to adjust on the value desired. The windings which must have such values or additional resistances (ohmic resistances or chokes) and must be connected into the lead so that the short circuit currents flowing for a short period can do no harm. It is, of course, also possible to provide for a relay arrangement acting immediately when the desired position has been reached, instead of the time switch.

The return leads may, of course, be combined into a single return lead. The time switch or the relay arrangement may be replaced by a switch present at the point of operation and to be operated by hand.

This development has arisen in the laboratories of Telefunken Gesellschaft für drahtlose Telegraphie m-b-H., of Berlin.

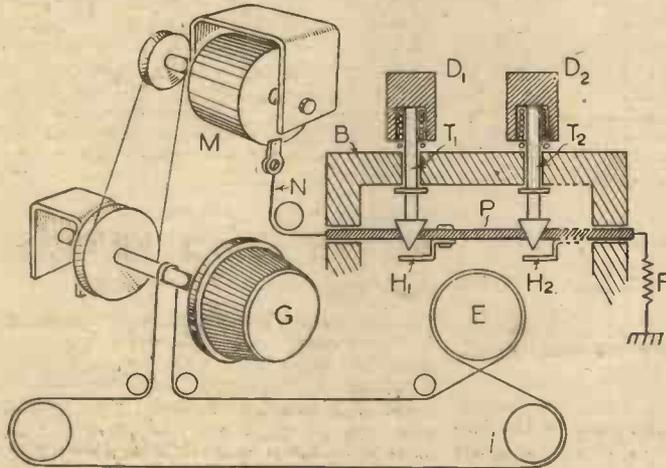


Fig. 7.—Diagram illustrating the principle of a motor-operated relay.

winding R, which opens the switch S and therefore interrupts the current circuit. In order to limit the short-circuit currents a suitable resistance  $R_1$ , which is shown in dashed lines in Fig. 3, may be connected in series with the relay winding.

**“Swinging” Adjustment**

The adjusting operation will really be “swinging,” as the contact will first run somewhat beyond the break, whereupon a control in opposite direction will take place. In any case the final position will be that as shown in Fig. 4.

It is also possible to use, instead of a motor with two windings with right-hand and left-hand rotations, a motor with only one winding on the condition that its direction of rotation can be reversed by reversing the polarity of the potential connected. Fig. 5 shows an example. In this circuit the sliding contact K is connected in series with the switch S, with the motor M and with the connection point of two potential supplies  $Q_1$  and  $Q_2$  connected in series in the same sense. The free pole of the potential supply  $Q_1$  is connected in series with the switch  $S^1$ , with a limiting resistance  $R_1$  and with the winding of the relay R to the contact surface  $F_1$ ; the free pole of the potential supply  $Q_2$  is connected through the limiting resistance  $R_2$  to the contact surface  $F_2$ . The two contact surfaces are constructed as half rings and arranged on a roller which is coupled with the spindle of the motor M and the variable condenser C. When the switch S is operated, the switch  $S^1$  has also to be switched in compulsorily whereupon the adjusting operation commences and the break moves in the direction towards the sliding contact K. As soon as the sliding contact makes contact with the two surfaces the motor is without current. A short-

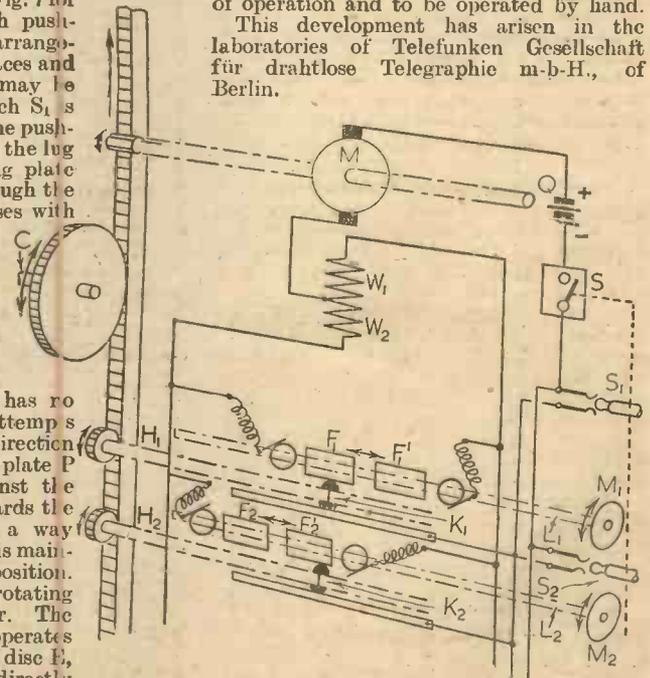


Fig. 8.—A remote-control system for an aircraft transmitter.

# LETTERS FROM READERS

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

## A Tuning Fault

SIR,—I was interested in reading the letter from Mr. R. W. Lyne in your issue dated June 10th, in which it was stated that the receiver was silent when tuned to London Regional only.

There are three possibilities which come to mind—but, of course, I am not offering any as an explanation in this instance.

1.—Is there anything in the aerial circuit which acts as a wave-trap tuned to London Regional?

2. Is there any component or circuit between the aerial and the detector tuned circuit which acts as a filter of the natural wavelength of London Regional?

3. Is there any component or circuit after the detector which resonates at the frequency of London Regional, or which has a natural wavelength corresponding to London Regional?

Please, Mr. Lyne, do not laugh at possibility No. 3. It has been proved that the loudspeaker output of a straight set can be tuned out and rendered inaudible when tuned in to a circuit which resonates at the same radio frequency to which the set is tuned.—D'ARCY FORD (Exeter).

## A Prizewinner's Thanks: Amateur Transmitting

SIR,—I wish to thank you for your very interesting and instructive book, "Practical Wireless Service Manual," awarded me for solving Problem No. 350. In my opinion, PRACTICAL AND AMATEUR WIRELESS is still as interesting as ever, and I particularly enjoy reading the present articles on "Communication Receivers." I hope to see some more articles on Amateur Transmitting.—M. S. CROTHALL (Folkestone).

[We hope to publish further articles on Amateur Transmitting from time to time, and another contribution to this series appears in the present issue.—ED.]

## A 14 Mc/s Log from Bournemouth

SIR,—I wish to thank you for publishing my letter concerning station YM4AZ. I submit my log of DX hams heard on 14 mc/s, phone and CW, between May 10th and June 5th, 1939.

CE3AT; CO8BC; CR7AU; CX2CO; FB8AH; FN1C; HI3N; K4EJF; K4FCV; K5AF; K6NYD; KA1AF; CS. HS. LB. 3KK, 7EC, EF; LU1CA, 4BH; PK1LK, MF, OG, RI, VY, 3WI, 4FS, HS, HW, KS; PY1FX, GJ, 2BH, DA, GC, HV, MI, 4CB, CT, 5AJ, AQ; U9BC; VE3KL; VK2AGU, AJU, 3BM, XG, 4CW, FJ, PF, SD; VP3CO, 5PZ, 6LN, MR, MY, YB, 9R; VQ2BI, CM, 3HJP, 4CRE; VS7RA; VU2FA, HB, LJ; W6FAL, GRL, KVJ; YV1AP, AQ, 5ABY, AK; ZB2B; ZC6RL; ZE1JN; ZL2GW, 4GY, ZS2BJ, 5Q, 6DY.

My receiver is a battery 0-v-2, with phones, and the antenna is an inverted-L in the roof.—PAUL W. GIFFORD (Bournemouth).

## Exchanging QSL Cards

SIR,—I saw in a recent issue of your paper an offer to exchange S.W.L. or B.R.S. or "A.A." cards. I would be pleased to acknowledge any cards by return post. Every success to your very fine paper.—CHARLES W. HARRIS (31, Bolingbroke Road, North Shields, Northumberland).

SIR,—I have been reading your fine paper for about two years, and find it very interesting. I would be very pleased to exchange my S.W.L. card, and correspond with any S.W. enthusiast.—R. JEALOUS (Ashleigh, Wardlaw Road, Bearsden, Dumbartonshire).

SIR,—I have been a reader of PRACTICAL AND AMATEUR WIRELESS for over two years, and find your articles very interesting, especially the short-wave section, in which I have found much to help me in my experiments, as I am a keen short-wave listener. I found the article "Mastering the Morse Code," in your issue No. 348, very helpful, as I am soon going up for my Morse test for a Licence. I would be glad to exchange my QSL card with any A.A. "Ham," full ticket "Ham," or any short-wave listener station anywhere

## CUT THIS OUT EACH WEEK

# Do you know

- THAT two pieces of connecting wire separated by insulated sleeving may be used as a small coupling condenser.
- THAT ordinary lighting flex is not suitable for modern multi-valve heater circuits when standard 1-amp. valves are used.
- THAT link coupling coils in transmitting apparatus should be placed at the "cold" end of the coils.
- THAT in push-pull circuits the position referred to above is in the centre of the coils.
- THAT a valve oscillator is the most useful morse practice unit as the note may be varied and better results thereby obtained.
- THAT an ordinary cathode-ray tuning indicator may be used as a signal strength meter.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, George Nennes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent. Copyright in all drawings, photographs and articles published in PRACTICAL AND AMATEUR WIRELESS is specifically reserved throughout the countries signatory to the Berne Convention and the U.S.A. Reproductions or imitations of any of these are therefore expressly forbidden.

who care to send theirs.—DENNIS G. GARRARD (135, Hervey Street, Ipswich, Suffolk.)

## A 20 M. Log from Northumberland

SIR,—Being a new reader of PRACTICAL AND AMATEUR WIRELESS I consider it is a fine weekly, and I look forward very much to every copy.

After seeing some fine logs, I felt I would like to submit mine. Although conditions have not been so good this last week, here is a log for 20 metres (June 4th to 11th).

YV1AQ, YV1ABQ, YV5AB, YV5ABF, PY4AFF, PY4BE, PY4CT, PY4BI, K4FAY, HK3CK, HK4CT, CE3BK, CE3DW, CE3AA, CE3IT, LU3HK, VP7NS, VP6FO, CN8MB, CO2RG, CO2RR, VE1BK, HI3M, OH1(10), OH2(12), OH8NW, SP1RP, SP2HH.

The usual amount of locals and Americans were logged, but predominant in my log-book these last few days seemed to be Italian "Hams."—A. T. BROWN (Gosforth, Northumberland).

## NEWS AND NOTES

### Paris Fair

IN this year's Paris Fair Radio Salon it would seem that television has been featured only for publicity purposes. Although it is agreed that the results shown represent a technical advance on what has been shown before, the programme material has not been chosen with the idea of stimulating the sales of home receivers. Looking ahead, however, and with the idea of promoting efforts on the technical side, the Société Française des Electriciens is arranging for a series of papers on the subject of television to be presented in Paris in November during what is called "Discussion Week." An invitation has been extended to English engineers to take part in the discussions, and by a healthy interchange of ideas it is hoped to progress the science to the mutual benefit of all concerned.

### Olympic Games Television

WHEN the Olympic Games were last held in Berlin the Reichspost Zentralamt made very elaborate arrangements for televising the most important events. Two forms of electron camera were used, together with an intermediate film scanner which was accommodated in an outside broadcast van. The pictures were received in specially designed rooms in Berlin where the public were admitted free of charge. One large screen was used, but in all other cases sets of a domestic type were employed. On many occasions the weather conditions were adverse, and when this occurred the pictures provided by the intermediate film scanner gave very superior results to those transmitted by either of the electron cameras, the normal contrast range with adequate detail being apparent. Next year the Olympic Games are to be held at Helsinki, in Finland, and it is learned that German television apparatus is to be installed in the principal sports arenas. In addition to reception on home type sets arrangements are being made for rediffusion on big screens in cinemas.

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# LATEST PATENT NEWS

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume or in bound volumes price 2s. each.

**Abstracts Published.**

**DIRECTIVE WIRELESS SIGNALLING.—**  
Lorenz Akt.-Ges., C. No. 500524.

Relates to spaced aerial systems of the Adcock type, particularly for short waves where the size of the aerial is of the order of the working wavelength. In this case the variable condenser, such as C, Fig. 1, inserted to balance the earth and aerial currents induced by horizontally-polarised waves is no longer fully effective, since the aerial reactance is not then predominantly capacitive. It is accordingly supplemented by (a) a resistance R and (b) by the inductance of the coil L which couples the aerial A to the shielded feed-line F. The coil L may be divided into two parts, these being arranged either in shunt or in series with the resistance R.

**WIRELESS RECEIVING-SETS; DESKS.**  
—Schwarzwald, A. No. 500762.

A programme holder for a wireless receiving-set is accommodated when not in use alongside one of the external walls of the receiver cabinet and is brought into use by moving it so as to project from the cabinet. In Fig. 2 the programme is supported by the plate 7 hinged at 5 to the batten 4 which is capable of a small slidable movement in the rail 3. This is in two

sections pivoted at 9 and slides under the cabinet top. The device may be folded up and stowed away under the cabinet top as indicated by the arrows b and c. In a modification (not shown), the supporting plate is hinged to a frame which slides down the back of the cabinet. In Fig. 3 (not shown), the programme is supported by a panel which is pivoted at one corner and swivels about this point in the plane of the cabinet back. Alternatively, the panel may be hinged to the side or top of the cabinet. In Fig. 4 the supporting plate 18 can be slid out of the drawer-like space 17 and swung downwards into a sloping position about the hinge 19. In any of the modifications described the programme may be illuminated by a lamp which is switched on automatically by the movement of the supporting plate.

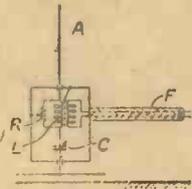


Fig. 1.

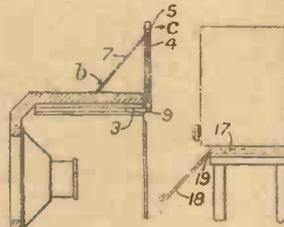


Fig. 2.

Fig. 4.

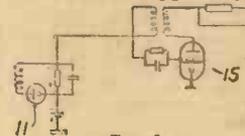


Fig. 5.

**TELEVISION.—**  
Cackett, F. W. (Telefunken Ges. fur Drahtlose Telegraphic). No. 500876.

A blocking-oscillator valve 15, Fig. 5, is so connected directly to the detector 11 of a receiver that the synchronising signals are separated from the picture signals, which modulate the carrier in the opposite direction, and the synchronising signals are converted to equal impulses. The oscillator 15 is blocked by the line impulse and unblocks only at the end of the subsequent line period.

## Television Features

**TELEVISION CONFERENCE**

THE first "television tea-party" will be held at Broadcasting House on June 22nd, when a number of regular home-viewers will have an opportunity to meet members of the Alexandra Palace staff, express their views and criticisms on the television service and hear an address by Mr. Gerald Cock, the Director of Television.

The Conference will be largely informal, and as the accommodation will be limited to a hundred and fifty, viewers who wish to attend should apply, before June 10th, on a postcard addressed to the Director of Television, Alexandra Palace, N.22, and marked "Conference."

The proceedings will open at 4.30 with tea, after which Sir Stephen Tallents, B.B.C. Controller of Public Relations, will take the chair, and Mr. Cock will speak.

It is hoped to include the Television Announcers among the visiting staff from Alexandra Palace, and viewers will also be able to chat with some of the producers and various people whose features are already familiar to them on the television screen.

The B.B.C. believes that this method of personal contact between the television staff and representative viewers will help the work of gauging the public's likes and dislikes, which was carried a step further with the launching of the television questionnaire early this year.

**WIMBLEDON TENNIS TOURNAMENT**

IMPROVED camera positions should give even better television pictures from the centre court at Wimbledon this year than in 1938 and 1937. Formerly the "shots" have been made from an oblique angle, but this time a "square on" view will be obtainable from a point opposite the Royal Box. In previous years one camera, used for occasional long-shots, has been left unattended, but this year all the cameras will be manned and will be brought frequently into circuit with rapid changes of lenses.

Television from Wimbledon will begin on July 1st, and as the all-important Finals Week proceeds, more and more play will be televised. On the last two days, July 7th and 8th, cameras will be in continuous operation from 2.30 to 5 p.m. The finals to be televised will include the men's and ladies' singles and the men's doubles.

## NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents and are published by permission of the Controller of H.M. Stationery Office. The Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. weekly (annual subscription £2 10s.).

**Latest Patent Applications.**

- 16010.—Belling and Lee, Ltd., and Hodby, A. L.—Holders for thermionic valves, etc. May 31st.
- 16011.—Belling and Lee, Ltd., and Strafford, F. R. W.—Aerial systems for radio receivers. May 31st.
- 15808.—Butterworth, A. R. C.—Cathode-ray film-recorder. May 30th.
- 15625.—Cole, Ltd., E. K., and Brooke, H. A.—Aerial circuit arrangements for multi-wave range radio-receivers. May 26th.
- 15921.—Kolster-Brandes, Ltd., and Beatty, W. A.—Transmission systems, etc. May 30th.
- 15711.—Kolster-Brandes, Ltd., and Smyth, C. N.—Synchronising systems for television, etc. May 26th.
- 15922.—Kolster-Brandes, Ltd., and Smyth, C. N.—Film-projectors. May 30th.
- 15779.—Philips Lamps, Ltd.—Electrolytic condensers. May 26th.
- 15780.—Philips Lamps, Ltd.—Super-heterodyne radio receivers with pre-set tuning. May 26th.
- 16078.—Philips Lamps, Ltd.—Super-heterodyne radio receivers. May 31st.
- 15714.—Rediffusion, Ltd., and Adorjan, P.—Electrical-communication systems. May 26th.

- 15883.—Thornton, A. A. (Philadelphia Storage Battery Co.)—Loop-equipped radio receivers. May 30th.
- 15665.—Vereingte Gluhlampen und Elektrizitats Akt.-Ges.—Visual tuning indicator. May 26th.

**Specifications Published.**

- 506063.—Kinross, R. I.—Aerial systems and circuits for use with such systems for wireless reception.
- 506072.—Triggs, W. W. (Riedel-E. de Haen Akt.-Ges., J. D.)—Method of applying carbon layers in television tubes. (Convention date not granted.)
- 506170.—Hausermann Vereinigte Fabriken Chemischer Gravuren Und Metallwaren Ges.—Dials for wireless receiving-sets.
- 506178.—Rosenthal, A. H.—Cathode-ray tubes.
- 506189.—Radioakt.-Ges. D. S. Loewe.—Elimination of signal weakening in television transmitters.
- 506082.—General Electric Co., Ltd., and Stenning, L. C.—Wireless receiving apparatus.
- 506112.—Berry, R. J. (Lorenz Akt.-Ges., C.)—Television receivers.
- 506113.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Radio receiving-apparatus.
- 506133.—Mongé, G. de.—Reception of radio transmissions.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.

## PRACTICAL MECHANICS HANDBOOK

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# QUERIES and ENQUIRIES

## Hum Trouble

"I have been using a home-made quality A.C. set for some time, and have recently made several 'improvements.' I find now, however, that hum is very noticeable, and wonder whether this indicates a fault or that improvement in L.F. response has made it audible. Can you suggest any tests which would be of use to me in this connection?"—L. R. (Banbury).

If your improvements did affect the frequency response it is quite possible that the hum has now been made audible and that it was previously present. A new speaker, for instance, might easily bring out the hum if the speaker gives better low-note response than a previous model. On the other hand, your circuit modifications may have led to a low-note resonance, or alterations in the wiring may have resulted in interaction, and therefore all of these points must be considered and the best plan is to make a stage-by-stage test, using phones where the signal strength is not too great and preferably with aerial removed so that the noise level in each stage may be more accurately judged.

## Aerial Design

"I was interested in the article recently published on aerials, and I should like advice concerning an improvement at my station. I am using a wire in the loft doubled to form an open square, the sides being about 10ft. long. Would it be an improvement if I suspended a wire along one side of the house, supported on insulators attached to wooden strips screwed to the gutter supports under the eaves? I am keen on improving long-distance reception, but cannot put up a good aerial in the garden owing to trees."—F. T. L. (Cardiff).

It should be possible to improve results with an outdoor aerial on the lines indicated. It was once an axiom that the best indoor aerial was not as good as the worst outdoor one, but in these days this is not entirely correct. However, if you support your outdoor wire, well clear of the gutter and wall, by using fairly long strips of wood with insulators at the end, you should notice a considerable improvement in range. The most important thing to remember, however, is that the aerial should be at least 1ft. from the gutter or wall.

## Dial Movement

"I have five controls on an experimental set, and these have ordinary control knobs with dials screwed to the panels. I find that the condensers on some of these controls are rather loose, and the result is that I cannot get an exact setting of the pointer, as the act of removing the fingers causes the spindle to make another partial turn and exact working is very difficult. Can you offer any suggestions?"—S. T. (S.W.4).

A GOOD plan in such a case, and one which has been adopted in one or two commercial sets, is to use discs of felt under the knobs. Remove one of the

knobs and obtain a piece of felt—such as carpet underlay—and cut discs just smaller than the diameter of the control knobs. Make holes in the centre to clear the spindles and then place the disc on the spindle and force the knob on so that the felt is wedged—not too firmly. In some cases, where a long spindle is used, it may be necessary to use two discs of the felt, but this will definitely be found to provide a nice smooth action which will be quite definite in setting and overcome your difficulty.

## RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporaries.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.
- (5) Grant interviews to enthusiasts.

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.

Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

## Tapping Bare Coils

"I am winding some ultra-short wave coils of the bare self-supporting type and wish to tap the coils for aerial and reaction. As the tapping points which I may need will have to be found experimentally I should like to know the best method of arranging for this. With ordinary clips there is a risk of short-circuiting adjacent turns and it means very wide spacing if the ordinary crocodile clip is to be used. I prefer these clips, as I have a fair number and they are so easy to handle."—W. L. D. (W.14).

WE appreciate your difficulty, and one way in which the trouble was overcome by us when building some similar experimental coils was to wind them with projections. A standard solid 1-inch diameter former was used, and a piece of 1/4 in. square section wood was employed in the following way. The wire was anchored and the first two or three turns placed on. The wood strip was then slipped up to the last turn and the next turn placed over the strip, pushing the wire down firmly to follow the contour of the strip. The wire was continued, and when the strip was reached again it was withdrawn until the next tapping point was called for. Then the wood strip was moved round the former so that the resultant projections were staggered. If desired each turn could be provided with projections in this manner, staggering them so that risks of short-circuits were avoided.

## Signal Strength and Coils

"I am anxious to get maximum volume from a crystal set, and should like to know

the best coil arrangement for this. I am not well up in theory, and should like a non-technical description as to the best arrangement for my purpose."—F. G. (Brondesbury).

THE crystal set has no form of amplification and therefore you need the greatest possible signal voltage across it. The signal voltage is dependent upon the differences in potential at each end of the coil, and therefore it is obvious that you need the largest possible coil which will tune to the station you require. Usually tuning is effected by means of a variable condenser, and thus the coil has to be chosen so that when this condenser is at minimum the desired minimum wavelength will be obtained. Usually this will give maximum volume for the circuit in question and at maximum wavelength position, with condenser at maximum, the signal strength is not the same owing to the change in the coil and condenser ratio, or L/C ratio as it is called. You should, therefore, wind your coil so that it may be tuned with the condenser almost at zero and a large diameter will enable more turns to be employed. They should preferably be slightly spaced.

## Aerial Condensers

"What is the best series aerial condenser to use? I should like to know the capacity and whether air or solid dielectric is best. The set is for short waves, for which I understand the condenser is essential."—V. R. (Sudbury).

ALTHOUGH you can use a variable condenser mounted on the panel, if you wish to make accurate dial settings you will find that variation in the condenser will alter tuning settings. A pre-set mounted at the rear of the baseboard or chassis will overcome this difficulty, or you can use an "artificial" condenser made up from twisted flex, binding a short lead from the aerial terminal to the aerial lead. If the set is to cover a wide wave-range then a panel-mounted condenser may be necessary to enable best results to be obtained on each band.

## REPLIES IN BRIEF

The following replies to queries are given in abbreviated form either because of non-compliance with our rules, or because the point raised is not of general interest.

G. R. H. (Winchester). We think the most suitable receiver in your case would be the Hurricane All-wave Three, blueprint P.W.89, issue dated April 30th, 1938. Kit "A" costs 42s.

H. H. (Darlington). The original coil unit is not now obtainable but you can use a set of Varley coils for this particular receiver.

L. W. (New Barnet). You could not expect more with the crystal receiver. An H.F. stage or a simple on-valve would be more useful in your case.

C. E. (Dagenham). Write to Raymart, Ltd., Holloway Head, Birmingham.

J. H. W. M. (Cranleigh). The A.C. Leader Three should be ideal for your purpose. The blueprint number is P.W.35C.

W. P. (Leeds, 9). We are unable to trace a firm at the moment handling the kit.

A. MacD. (Dingwall). We suggest you obtain a copy of the "Wireless Constructor's Encyclopedia" and then build one of the simpler receivers which we describe from time to time.

F. B. (Walkden). A large number of names and addresses of amateurs in all parts of the world will be found in the "Radio Amateur's Call Book," obtainable from F. L. Postlethwaite, 41, Kinfauns Road, Goodmayes, Ilford, Essex, price 5s. 3d., post free.

G. W. R. (Beanty). Straight push-pull is to be preferred. One of the transformers may be an output component with variable tapplings, and this would account for the number of terminals. There must be five terminals to the input component. B stands for H.T.

The coupon on page iii of cover must be attached to every query.

# Practical and Amateur Wireless BLUEPRINT SERVICE

PRACTICAL WIRELESS		No. of	SUPERHETS.	
CRYSTAL SETS.		Date of Issue.	Blueprint.	
<b>Blueprints, 6d. each.</b>				
1937 Crystal Receiver	—	—	PW71	
The "Junior" Crystal Set	27.8.38	—	PW94	
<b>STRAIGHT SETS. Battery Operated.</b>				
<b>One-valve : Blueprints, 1s. each.</b>				
All-Wave Unipen (Pentode)	—	—	PW31A	
Beginners' One-Valver	19.2.38	—	PW85	
The "Pyramid" One-valver (HF Pen)	27.8.38	—	PW93	
<b>Two-valve : Blueprints, 1s. each.</b>				
Four-range SuperMag Two(D, Pen)	—	—	PW36B	
The Signet Two (D & LF)	24.9.38	—	PW76	
<b>Three-valve : Blueprints, 1s. each.</b>				
The Long-range Express Three (SG, D, Pen)	24.4.37	—	PW2	
Selectone Battery Three (D, 2 LF (Trans))	—	—	PW10	
Sixty Shilling Three (D, 2 LF (RC & Trans))	—	—	PW34A	
Leader Three (SG, D, Pow)	22.5.37	—	PW35	
Summit Three (HF Pen, D, Pen)	—	—	PW37	
All Pentode Three (HF Pen, D (Pen), Pen)	29.6.37	—	PW30	
Hall-mark Three (SG, D, Pow)	12.6.37	—	PW41	
Hall-mark Cadet (D, LF, Pen (RC))	16.9.35	—	PW48	
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three)	13.4.35	—	PW40	
Genet Midget (D, 2 LF (Trans))	June '35	—	PM1	
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	—	PW51	
1936 Sonotone Three-Four (HF Pen, HF Pen, Westcor, Pen)	—	—	PW53	
Battery All-Wave Three (D, 2 LF (RC))	—	—	PW55	
The Monitor (HF Pen, D, Pen)	—	—	PW01	
The Tutor Three (HF Pen, D, Pen)	21.3.36	—	PW62	
The Centaur Three (SG, D, P)	14.8.37	—	PW04	
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	—	PW69	
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	18.2.39	—	PW72	
The "Rapid" Straight 3 (D, 2 LF (RC & Trans))	4.12.37	—	PW82	
F. J. Camm's Oracle All-Wave Three (HF, Det., Pen)	28.8.37	—	PW78	
1938 "Triband" All-Wave Three (HF Pen, D, Pen)	22.1.38	—	PW84	
F. J. Camm's "Sprite" Three (HF Pen, D, Det)	26.3.38	—	PW87	
The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	30.4.38	—	PW89	
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet)	3.9.38	—	PW92	
<b>Four-valve : Blueprints, 1s. each.</b>				
Sonotone Four (SG, D, LF, P)	1.5.37	—	PW4	
Fury Four (2 SG, D, Pen)	8.5.37	—	PW11	
Beta Universal Four (SG, D, LF, Cl. B)	—	—	PW17	
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	—	PW34B	
Fury Four Super (SG, SG, D, Pen)	—	—	PW34C	
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	—	—	PW46	
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36	—	PW67	
All-Wave "Corona" 4 (HF Pen, D, LF, Pow)	9.10.37	—	PW79	
"Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B.)	12.2.38	—	PW33	
The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC))	3.9.38	—	PW90	
<b>Mains Operated.</b>				
<b>Two-valve : Blueprints, 1s. each.</b>				
A.C. Twin (D (Pen), Pen)	—	—	PW18	
A.C.-D.C. Two (SG, Pow)	—	—	PW31	
Selectone A.C. Radiogram Two (D, Pow)	—	—	PW19	
<b>Three-valve : Blueprints, 1s. each.</b>				
Double-Diode-Triode Three (HF Pen, DDT, Pen)	—	—	PW23	
D.C. Ace (SG, D, Pen)	—	—	PW25	
A.C. Three (SG, D, Pen)	—	—	PW29	
A.C. Leader (HF Pen, D, Pow)	7.1.39	—	PW35C	
D.C. Premier (HF Pen, D, Pen)	31.3.34	—	PW35B	
Ubique (HF Pen, D (Pen), Pen)	28.7.34	—	PW36A	
Armada Mains Three (HF Pen, D, Pen)	—	—	PW38	
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	—	PW50	
"All-Wave" A.C. Three (D, 2 LF (RC))	—	—	PW54	
A.C. 1936 Sonotone (HF Pen, HF Pen, Westcor, Pen)	—	—	PW56	
Mains Record All-Wave 3 (HF Pen, D, Pen)	6.12.36	—	PW70	
All-Wave Ace (HF Pen, D, Pen)	28.8.37	—	PW80	
<b>Four-valve : Blueprints, 1s. each.</b>				
A.C. Fury Four (SG, SG, D, Pen)	—	—	PW20	
A.C. Fury Four Super (SG, SG, D, Pen)	—	—	PW34D	
A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37	—	PW45	
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	—	PW47	
A.C. All-Wave Corona Four	6.11.37	—	PW81	

PRACTICAL WIRELESS		No. of	SUPERHETS.	
CRYSTAL SETS.		Date of Issue.	Blueprint.	
<b>Battery Sets : Blueprints, 1s. each.</b>				
£5 Superhet (Three-valve)	5.6.37	—	PW40	
F. J. Camm's 2-valve Superhet	13.7.35	—	PW52	
F. J. Camm's "Vitesse" All-Waver (5-valver)	27.2.37	—	PW75	
<b>Mains Sets : Blueprints, 1s. each.</b>				
A.C. £5 Superhet (Three-valve)	—	—	PW43	
D.C. £5 Superhet (Three-valve)	1.12.34	—	PW42	
Universal £5 Superhet (Three-valve)	—	—	PW44	
F. J. Camm's A.C. £4 Superhet 4	31.7.37	—	PW50	
F. J. Camm's Universal £4 Superhet 4	—	—	PW60	
"Qualitone" Universal Four	16.1.37	—	PW73	
<b>Four-valve : Double-sided Blueprint, 1s. 6d.</b>				
Push-Button 4, Battery Model	22.10.38	—	PW95	
Push-Button 4, A.C. Mains Model	—	—	—	
<b>SHORT-WAVE SETS.</b>				
<b>One-valve : Blueprint, 1s.</b>				
Simple S.W. One-valver	9.4.38	—	PW88	
<b>Two-valve : Blueprints, 1s. each.</b>				
Midget Short-wave Two (D, Pen)	—	—	PW38A	
The "Fleet" Short-wave Two (D (HF Pen), Pen)	27.3.38	—	PW91	
<b>Three-valve : Blueprints, 1s. each.</b>				
Experimenter's Short-wave Three (SG, D, Pow)	30.7.38	—	PW30A	
The Perfect 3 (D, 2 LF (RC and Trans))	7.8.37	—	PW63	
The Band-Spread S.W. Three (HF Pen, D (Pen), Pen)	1.10.38	—	PW68	
<b>PORTABLES.</b>				
<b>Three-valve : Blueprints, 1s. each.</b>				
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	—	—	PW65	
Parvo Flyweight Midget Portable (SG, D, Pen)	3.6.39	—	PW77	
<b>Four-valve : Blueprint, 1s.</b>				
"Imp" Portable 4 (D, LF, LF (Pen))	19.3.38	—	PW86	
<b>MISCELLANEOUS.</b>				
S.W. Converter-Adapter (1 valve)	—	—	PW48A	
<b>AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.</b>				
<b>Blueprints, 6d. each.</b>				
Four-station Crystal Set	23.7.38	—	AW427	
1934 Crystal Set	—	—	AW444	
150-mile Crystal Set	—	—	AW450	
<b>STRAIGHT SETS. Battery Operated.</b>				
<b>One-valve : Blueprint, 1s.</b>				
B.B.C. Special One-valver	—	—	AW387	
<b>Two-valve : Blueprints, 1s. each.</b>				
Melody Ranger Two (D, Trans)	—	—	AW388	
Full-volume Two (SG det, Pen)	—	—	AW392	
Lucerne Minor (D, Pen)	—	—	AW426	
A Modern Two-valver	—	—	WM409	
<b>Three-valve : Blueprints, 1s. each.</b>				
Class B Three (D, Trans, Class B)	—	—	AW386	
Fan and Family Three (D, Trans, Class B)	25.11.33	—	AW410	
£5 5s. S.G.3 (SG, D, Trans)	2.12.33	—	AW412	
Lucerne Ranger (SG, D, Trans)	—	—	AW422	
£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	—	AW435	
Lucerne Straight Three (D, RC, Trans)	—	—	AW437	
Transportable Three (SG, D, Pen)	—	—	WM271	
Simple-Tune Three (SG, D, Pen)	June '33	—	WM327	
Economy-Pentode Three (SG, D, Pen)	—	—	—	
"W.M." 1934 Standard Three (SG, D, Pen)	Oct. '33	—	WM337	
£3 3s. Three (SG, D, Trans)	Mar. '34	—	WM351	
1935 £6 6s. Battery Three (SG, D, Pen)	—	—	WM354	
PTP Three (Pen, D, Pen)	—	—	WM371	
Certainty Three (SG, D, Pen)	—	—	WM389	
Minute Three (SG, D, Trans)	—	—	WM393	
All-Wave Winning Three (SG, D, Pen)	—	—	WM396	
<b>Four-valve : Blueprints, 1s. 6d. each.</b>				
65s. Four (SG, D, RC, Trans)	—	—	AW370	
2HF Four (2 SG, D, Pen)	—	—	AW421	
Self-contained Four (SG, D, LF, Class B)	Aug. '33	—	WM331	
Lucerne Straight Four (SG, D, LF, Trans)	—	—	WM350	
£5 5s. Battery Four (HF, D, 2 LF)	Feb. '35	—	WM381	
The H.K. Four (SG, SG, D, Pen)	Mar. '35	—	WM384	
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	Apr. '36	—	WM404	
<b>Five-valve : Blueprints, 1s. 6d. each.</b>				
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Class B Quadrydne (2 SG, D, LF, Class B)	—	—	WM344	
New Class B Five (2 SG, D, LF, Class B)	—	—	WM340	

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Amateur Wireless	—	—	4d. "
Practical Mechanics	—	—	7d. "
Wireless Magazine	—	—	13 "

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Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable) to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

<b>Mains Operated.</b>			
<b>Two-valve : Blueprints, 1s. each.</b>			
Consoelectric Two (D, Pen) A.C.	—	—	AW403
Economy A.C. Two (D, Trans) A.C.	—	—	WM286
Unicorn A.C.-D.C. Two (D, Pen)	—	—	WM394
<b>Three-valve : Blueprints, 1s. each.</b>			
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Mantovani A.C. Three (HF Pen, D, Pen)	—	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	—	Jan. '36	WM401
<b>Four-valve : Blueprints, 1s. 6d. each.</b>			
All Metal Four (2 SG, D, Pen)	—	July '33	WM329
Harris' Jubilee Radiogram (HF Pen, D, LF, P)	—	May '35	WM366

<b>SUPERHETS.</b>			
<b>Battery Sets : Blueprints, 1s. 6d. each.</b>			
Modern Super Senior	—	—	WM375
'Vaasity Four	—	Oct. '35	WM395
The Request All-Waver	—	June '36	WM407
1935 Super-Five Battery (Superhet)	—	—	WM379
<b>Mains Sets : Blueprints, 1s. 6d. each.</b>			
Heptode Super Three A.C.	—	May '34	WM359
"W.M." Radiogram Super A.C.	—	—	WM360

<b>PORTABLES.</b>			
<b>Four-valve : Blueprints, 1s. 6d. each.</b>			
Holiday Portable (SG, D, LF, Class B)	—	—	AW395
Family Portable (HF, D, RC, Trans)	—	—	AW447
Two H.F. Portable (2 SG, D, QP21)	—	—	WM363
Tyers Portable (SG, D, 2 Trans)	—	—	WM367

<b>SHORT-WAVE SETS—Battery Operated.</b>			
<b>One-valve : Blueprints, 1s. each.</b>			
S.W. One-valver for America	15.10.38	—	AW429
Rome Short-waver	—	—	AW452
<b>Two-valve : Blueprints, 1s. each.</b>			
Ultra-short Battery Two (SG det, Pen)	—	Feb. '36	WM402
Home-made Coil Two (D, Pen)	—	—	AW440
<b>Three-valve : Blueprints, 1s. each.</b>			
World-ranger Short-wave 3 (D, RC, Trans)	—	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.0.34	—	AW438
The Carrier Short-waver (SG, D, P)	—	July '35	WM390
<b>Four-valve : Blueprints, 1s. 6d. each.</b>			
A.W. Short-wave World-Beater (HF Pen, D, RC, Trans)	—	—	AW436
Empire Short-waver (SG, D, RC, Trans)	—	—	WM313
Standard Four-valver Short-waver (SG, D, LF, P)	—	Mar. '35	WM383
Superhet : Blueprint, 1s. 6d.	—	—	—
Simplified Short-wave Super	—	Nov. '35	WM397

<b>Mains Operated.</b>			
<b>Two-valve : Blueprints, 1s. each.</b>			
Two-valve Mains Short-waver (D, Pen) A.C.	—	—	AW453
"W.M." Long-wave Converter	—	—	WM380
<b>Three-valve : Blueprint, 1s.</b>			
Emigrator (SG, D, Pen) A.C.	—	—	WM352
<b>Four-valve : Blueprint, 1s. 6d.</b>			
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	—	Aug. '35	WM391

<b>MISCELLANEOUS.</b>			
<b>S.W. One-valve Converter (Price 6d.)</b>			
Enthusiast's Power Amplifier (1/6)	—	—	AW329
Listener's 5-watt A.C. Amplifier (1/6)	—	—	WM392
Radio Unit (2v.) of WM392 (1/-)	—	Nov. '35	WM398
Harris Electrogram battery amplifier (1/-)	—	—	WM399
De Luxe Concert A.C. Electrogram (1/-)	—	Mar. '36	WM403
New Style Short-wave Adapter (1/-)	—	—	WM388
Trickle Charger (6d.)	—	Jan. 5, '35	AW462
Short-wave Adapter (1/-)	—	—	AW456
Superhet Converter (1/-)	—	—	AW457
B.L.D.L.C. Short-wave Converter (1/-)	—	May '36	WM405
Wilson Tone Master (1/-)	—	June '36	WM406
The W.M. A.C. Short-wave Converter (1/-)	—	—	WM408

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SPECIAL CLEARANCE OFFERS!

**POTENTIOMETERS WITH SWITCH,** 1 meg., 1 meg., 20,000 ohms and 10,000 ohms, 1/3 each.  
**POTENTIOMETERS WITHOUT SWITCH,** 2 meg., 1 meg., 1/2 meg., 400,000 ohms, 25,000 ohms, 20,000 ohms, 10,000 ohms, 1/- each.  
**SPECIAL OFFER—CONTINENTAL MAINS VALVES,** 4v. AC Types, 5-pin only, AC/HL, AC/L, AC/P, AC/SO, AC/VMS, AC/HP, AC/VHP, 2/6 each.

**20V. 18a AC/DC Types, SG., Var. Mu. SG., Power, HF Pen.,** 2/- each.

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**TUBULAR CONDENSERS,** .002, .0001, .0003 and .0005 mfd., 1/- doz. Your choice.

**ELECTROLYTIC CONDENSERS.** Metal Can. 8 mfd. 320 volts, for 1.6. 8+8 mf. 475v.+10 mf. 50v., 2 for 2/6. 8+8 mf. 450v.+8 mf. 250v., 2 for 2/6.

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**LISSON Power Packs** in aluminium cases, 150 v., 25 ma., with 6.3 v. L.T., 100-250 v. mains, 10/6, with Rectifier.

**MORSE KEYS.** Excellent brass movement on bakelite base, 2/9 each.

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**PREMIER Heavy Duty Class B Driver Transformers,** 5/- each.

**COSMOCORD PICK-UPS** with arm and vol. control, 8/6 each. Pick-up Heads only, 4/6 each.

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Guaranteed Accuracy within ± 2 per cent.

Model No. 21. Model No. 311.  
3in. square case. 3 1/2in. diameter round case.

0-1 m/A. .. 18/6 0-1 m/A. .. 22/6

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0-100 m/A. .. 17/6 0-100 m/A. .. 20/-

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Model 311. 0-1 m/A. movement, with calibrated scale, volts-ohms-m/A., 25/-.

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**TAPPED SHUNT** to provide readings of 5 m/A., 25 m/A., 250 m/A., and 1,000 m/A., 5/6.

**PREMIER SHORT-WAVE KITS.**

Complete to the last detail including all Valves and coils, as well as theoretical and wiring diagrams and lucid instructions for building and working. Each kit is supplied with a steel Chassis and Panel and uses plug-in coils to tune from 13 to 170 metres.

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1 Valve Short-Wave Superhet Converter Kit 20/-

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2 Valve Short-Wave Receiver Kit .. 25/-

3 Valve Short-Wave Screen Grid and Pentode Kit .. 58/6

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**PREMIER SHORT-WAVE COILS,** 4- and 6-pin types, 13-22, 22-47, 41-94, 76-170 metres, 1/9 each, with circuit. Special set of S.W. Coils, 14-150 metres, 4/- set, with circuit. Premier 3-band S.W. coil, 11-25, 19-43, 38-86 metres. Suitable any type circuit, 2/6.

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**UTILITY Micro Cursor Dials,** Direct and 100:1 Ratios, 3/9.

**PREMIER Short-Wave Condensers,** all-brass construction, with Trolitul insulation. 15 mmf., 1/6; 25 mmf., 1/7; 40 mmf., 1/9; 100 mmf., 2/-; 160 mmf., 2/3; 250 mmf., 2/6.

**TROLITUL DOUBLE SPACED TRANSMITTING CONDENSERS.** 15 mmf., 2/9; 40 mmf., 3/6; 100 mmf., 4/-; 160 mmf., 4/6.

**NEW TROLITUL SPLIT STATOR CONDENSERS,** 50 x 50 mmf., 10/5.

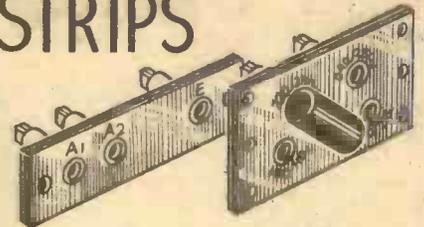
**COIL FORMERS,** 4- or 6-pin low-loss, 1/- each. Orders 5/- and over sent Post Free. Under 5/- please add 6d. Postage.

Have you had our 1939 Catalogue, Handbook and Valve Manual? 90 pages of Radio Bargains and Interesting Data. Price 6d.

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**CALLERS TO:** Jubilee Works, or our NEW PREMISES, 169, FLEET STREET, E.C.4.  
Central 2833.

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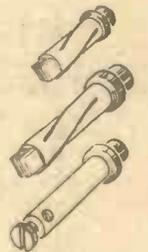
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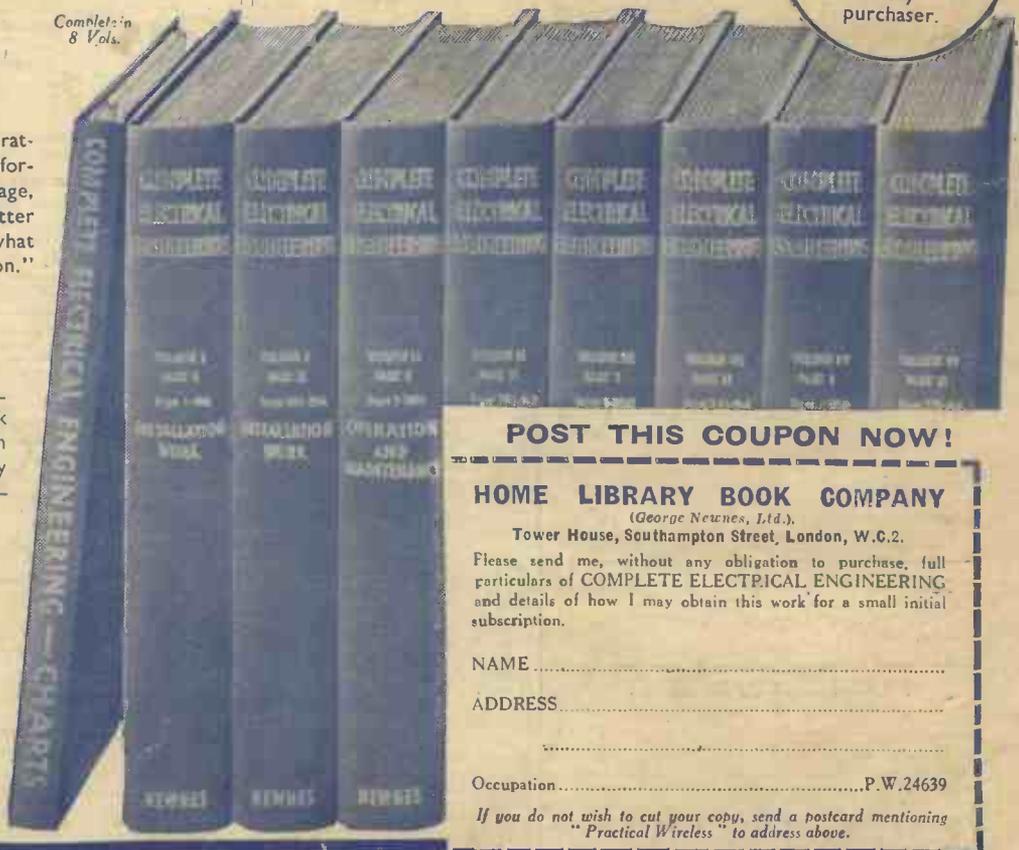
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